ESSAYS

RELATING TO

AGRICULTURE

AND

RURAL AFFAIRS.

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RURAL AFFAIRS.

VOLUME SECOND.

THE SECOND EDITION, WITH LARGE ADDITIONS.

BY

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In omnibus rebus, et maxime physicis, quid non sit, citius quam quid sit, dixerim.
CICERO.

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PREFACE.

PREFACE.

THE following Eſſay is a very inconſiderable fragment of a much larger work, in which the author had made but ſmall progreſs, when the event mentioned in the introductory advertiſement put a ſtop to the farther proſecution of it. And, as it is poſſible that he may never have leiſure, or be in ſuch a ſituation as to enable him to finiſh that work as he at firſt intended, he has been prevailed upon by his Bookſeller to offer it to the public in its preſent imperfect

ſtate,

ſtate, hoping that, even in this imperfect ſtate, it may be of ſome uſe in directing the attention of future enquirers to proper objects.——To contribute farther towards that end, the following ſhort account is given of the author's deſign, and the motives that originally induced him to engage in this undertaking.

From particular circumſtances, nowiſe intereſting to the reader, he was neceſſarily engaged in the practice of Agriculture at a very early period of life; and being naturally delighted with the innocent pleaſures which that mode of life preſented to an ingenuous mind, he engaged in the ſtudy of it with an ardour natural to the impetuoſity of youth. By conſulting ſuch authors on this ſubject as fell in his way, he ſoon found

found himſelf deeply involved in intricate phyſical diſcuſſions about the *pabulum* of plants,—the influence of ſalts, oils, acids, and many other ſuch like ſubſtances, of which he could form but a very vague and indeterminate idea, ſo as not to be able with certainty to perceive the full force of ſuch arguments as were adduced by theſe authors in ſupport of their favourite hypotheſes. And, being unwilling to be inſtructed by halves, or to take the *word* of any author as a *demonſtration* of the propoſition that he aſſumed; he applied himſelf with diligence to acquire a knowledge of thoſe ſciences that ſeemed neceſſary to be attained before he could peruſe theſe authors with profit.

But,

But, inſtead of reaping the benefit from thence that he had at firſt expected, he had the mortification to find, that almoſt all theſe writers were equally ignorant of the real qualities of the ſubſtances whoſe names they employed, as he himſelf had been; and that each having formed in his own mind a vague and indeterminate idea of ſome imaginary ſubſtance, endowed with as imaginary qualities, modelled by his fancy, ſo as exactly to ſuit the hypotheſis he had aſſumed, gave to it the name of *ſalt*, *oil*, *acid*, or any other that chanced firſt to occur to his imagination, and then employed it on all occaſions to explain every difficulty that might occur with regard to the theory or practice of Agriculture.

And

And as they, for the moſt part, argued with a degree of confidence exactly proportioned to their own ignorance, he found that the influence of theſe empirical theoriſts had extended ſo far, as to infeſt the minds of ſober practical farmers to ſuch a degree, as to render them, in many caſes, incapable of drawing impartial concluſions from the obſervations that their own experience might have afforded, and thus prevented them from writing intelligibly on almoſt any practical ſubject, they being conſtantly deſirous of adapting facts to their own whimſical and abſurd theories.

Tired, at length, with repeated fruitleſs endeavours to attain uſeful knowledge in this way, and diſguſted with the nonſenſical jargon that he was obliged to read, he, in a

ſort

ſort of literary apathy, threw aſide his books, and reſolved to diſengage his mind from theoretical reaſoning as much as poſſible, and, with unprejudiced ſincerity of intention, attend to practice alone, as the only ſure mode of inſtruction.

As he was thus, in ſome meaſure, obliged to retire, as it were, within himſelf for inſtruction, and to meditate upon the moſt effectual means of attaining it, he ſoon perceived, that, as a vague and inaccurate mode of reaſoning had been too freely admitted into this ſcience, in conſequence of which concluſions were frequently drawn from premiſes that could not have been authorized by any accurate mode of induction; it behoved a farmer, who wiſhed to make any ſolid attainments in uſeful knowledge, firſt

of

of all to accuſtom himſelf to an accurate mathematical mode of reaſoning, ſo as carefully to diſtinguiſh between the *eſſential* and *accidental* circumſtances that might on any occaſion tend to vary the reſult of any experiment, and conſtantly guard againſt admitting any thing as a fact upon which any future reaſoning ſhould be erected, until it had been previouſly examined with the moſt ſcrupulous attention, and demonſtrated to be ſuch.

But, when he began to apply this rule ſteadily in examining into the truth of thoſe facts, uſually admitted as axioms * into this

* Axiom in mathematics is a term employed to denote thoſe ſelf-evident truths that are ſo obvious to the underſtanding, as to be readily recogniſed as ſuch without any ſort of demonſtration; and, therefore,

ſcience, it is difficult to deſcribe the diſappointment that he met with; when, inſtead of that certainty he hoped for, and upon which he had, on many occaſions, formerly relied, he found himſelf involved in doubtful obſcurity. And it was not without amazement, that he perceived how very little was, with certainty, known in an art ſo abſolutely neceſſary to the well being of mankind. Nor does he imagine that any one, who has not with attention examined it in this point of view, could think it poſſible that an art that has been practiſed for ſo many ages by all civilized nations, ſhould be ſtill involved in ſuch great uncertainty in almoſt

fore, ſerve as a baſis upon which other demonſtrations may be erected.—Such as a part is not ſo great as the whole, &c.

almoſt every particular, as it will be found to be.

This being the caſe, it was obvious that materials for forming any rational theory of this art were ſo very ſcanty, that little elſe but hypothetical conjecture could be expected in that way, until facts were more accurately authenticated. And, as he is ſenſible that it requires an uncommonly philoſophical turn of mind, and cultivated underſtanding, to be able to ſelect with judgment ſuch leading facts as might ſerve as a baſis to an infant theory, or to make ſuch experiments as might be deciſive in this point of view, he would wiſh to turn the attention of the farmer altogether from theſe purſuits; and allowing the man of ſcience to ſtudy it as a ſcience, he means to content himſelf with

viewing

viewing it as an œconomical art, on the proper knowledge of which, as ſuch, the proſperity and happineſs of numbers of his fellow creatures materially depends. And, happy he will deem himſelf, if his efforts in this way ſhall be attended with ſucceſs.

Leaving, therefore, the philoſopher to purſue his ſublime ſpeculations, and, proceeding in the more humble walk to which he had confined himſelf, it readily occurred, that, as thoſe who practiſe agriculture are uſually confined to a particular ſpot, their obſervations muſt neceſſarily be confined to thoſe few objects that come within their own narrow ſphere. And, as their attention is uſually employed in cultivating ſuch plants, or rearing ſuch animals, or proſecuting ſuch a mode of culture as chance may have recommended

commended to their notice, without being acquainted with all the varieties of theſe that may be met with in different parts of the earth, or knowing the caſes in which others might be ſubſtituted inſtead of theſe with advantage; they are thus, in a great many caſes, ignorant of what might be done for their own emolument, nor know how to make the greateſt advantage of their own particular ſituation; ſo that, not being ſenſible of their real wants, they remain contented with what they only in ſome meaſure know, without making thoſe efforts, which, if properly directed, muſt naturally tend very much to improve that art which they practiſe.

In theſe circumſtances, he imagined that nothing could promiſe to be of more real

utility

utility to the practical farmer, than a work that was calculated to preſent to him a conciſe view of all thoſe objects that might demand his attention, when he ſhould be ſo circumſtanced as to have any particular object principally in view; that, by thus having at all times before his eyes, a diſtinct view of all the circumſtances that could affect him, he might be in no danger of overlooking any of them; and, by thus having ſome fixed object continually in his eye, he might be enabled to advance with ſome degree of certainty, inſtead of purſuing that devious and deſultory courſe, to which he is, in the preſent ſituation of affairs, ſo much expoſed.

In purſuing theſe diſquiſitions, he imagined, that, as the proper buſineſs of the farmer

mer may be ſaid to conſiſt in rearing ſuch crops as may be uſeful to man, and, in managing or diſpoſing of theſe, ſo as that they might turn out to the greateſt benefit to himſelf, and good to the public, the whole of the objects that could lay claim to his attention might properly be reduced to the three following general heads, viz.

1*ſt*, The knowledge of the different properties of all the plants that can be raiſed by the farmer;—the different uſes to which theſe can be in any caſe applied; and the moſt oeconomical method of conſuming, or otherwiſe diſpoſing of them.

2*d*, The knowledge of the nature and diſtinguiſhing qualities of the different animals that may be kept for carrying on the various operations of Agriculture, and of thoſe that

are

are reared for the purpoſe of conſuming theſe plants; and the proper method of treating the different varieties of them, ſo as to make any one kind of food, on all occaſions, produce the greateſt poſſible effect. And,

3*d*, The knowledge of ſoils; the way of manuring and cultivating theſe, ſo as beſt to fit them for rearing ſuch valuable plants as it may be moſt beneficial for the farmer to rear. For,

Unleſs a man is acquainted with *all* the plants that can be reared in his ſoil or climate, and with *all* the diſtinguiſhing qualities and peculiar properties * of each, ſo as to

* This paſſage has ſomewhat the appearance of a tautology, or unmeaning amplification, that the author knew not how to avoid. By *diſtinguiſhing qualities*, he would wiſh to denote thoſe peculiarities that are often remarked in the manner of growth, time of

to know with certainty in what circumſtances any one of theſe could be raiſed to the greateſt perfection, and for what purpoſes they could be moſt oeconomically employed, he cannot be ſaid to have attained a perfect knowledge of rural oeconomics *.

of vegetating, &c. of plants; and, by *peculiar properties*, he would be underſtood to mean, the medical qualities, if he may uſe that expreſſion, or thoſe qualities by which they are fitted to affect the animal oeconomy, when conſumed by any living creature. The meaning of this diſtinction will be more obvious from many paſſages in the following diſquiſitions.

* I have here ventured to adopt a term from a foreign language, for want of a proper one in our own. The word Agriculture, in Engliſh, is often underſtood to expreſs all thoſe circumſtances that belong to the ſcience here treated of, altho', from the obvious etymology of the word, it ſeems to be forced from its natural and proper ſignification.

Unleſs a man is acquainted with *all* the animals that it is in his power to rear, and knows the peculiar diſtinguiſhing qualities, and the moſt proper method of treating each claſs of animals in all circumſtances,—the ſeveral products that may be obtained from each, and the eaſieſt method of encreaſing or diminiſhing any one of theſe, as he may find beſt to ſuit his circumſtances, he muſt be conſidered as ignorant of a very important branch of knowledge in this art. And,

Unleſs he knows the particular ſoil, and the mode of culture that is beſt adapted to rear each of theſe plants with the greateſt poſſible perfection, he cannot practiſe the art of Agriculture with all the advantage that he might otherwiſe derive from it.

But,

But, if he knew in every caſe what plants his ſoil, in the ſtate in which it might chance to be at any one time, could rear to the greateſt perfection;—if he knew the manner of treating that ſoil, ſo as to bring it to rear other plants that it was not naturally fitted to produce;—if he were thoroughly acquainted with all the diſtinguiſhing qualities of every one of theſe plants, and knew, with certainty, the way in which they might be diſpoſed of, or conſumed with the greateſt advantage to himſelf; and, if he were perfectly acquainted with the nature and peculiar qualities of every animal that he could rear, and particularly inſtructed in the beſt method of managing ſuch animals as the plants he could raiſe were beſt adapted to nouriſh; ſo as to make every particular ſpe-

cies

cies of food produce the greateſt poſſible effect, he would, on all occaſions, be able to employ his time and labour to the utmoſt advantage for himſelf, and benefit to the public, and might be ſaid to have attained the higheſt degree of knowledge in this art that could be deſired.

Whether it is poſſible for human powers ever to attain to this ſummit of perfection, is extremely doubtful. But, it is probable, that thoſe will come neareſt to it, who having their eye conſtantly fixed upon the goal, know, with ſome degree of certainty, the diſtance they are from it, and the obſtacles that muſt be overcome before they can reach it; and, with a well directed perſeverence, ſteadily preſs forward with unremitting ardour.

To

To aſſiſt ſuch ingenuous enquirers, it was propoſed to enter into an accurate examination of all the particular branches that might appertain to each of the general heads above enumerated,—to endeavour to point out, under each particular head, what were the circumſtances, that it would be of the greateſt importance for him to know;—to enquire with accuracy what particulars relating to each had been already diſcovered;—to diſtinguiſh, by a careful diſcrimination, the facts that had been eſtabliſhed with certainty from thoſe that had been adopted without ſufficient proofs, and to point out the moſt probable means of proſecuting future diſcoveries; that thus he might be enabled, at one view, not only to perceive all thoſe circumſtances that ought principally to lay claim to his

his attention, relating to any particular object, but alſo to know all that had been hitherto with certainty diſcovered with regard to it, and the ineffectual efforts that had been made for farther improvements therein; that he might thus be taught the moſt likely way of availing himſelf of the experience of others, ſo as to acquire the wiſhed for certainty with regard to doubtful facts, and thus, in the moſt effectual manner, promote the progreſs of uſeful knowledge.

Such was the original plan of that work which gave riſe to the following diſquiſitions; but the undertaking was arduous, and the ſituation of the author by no means favourable for compleating ſuch an extenſive undertaking. Upon which account, as well as the diſcouraging event mentioned in the introductory

ductory advertiſement, the proſecution of it, upon that extenſive ſcale, has been laid aſide.

What is now offered to the public, can only be looked upon as a bare ſkeleton of a ſmall part of that work; as the following ſketches contain little elſe than a few unconnected doubts and queries, with a view to direct the attention of the farmer to ſome objects that do not ſeem as yet to have been ſufficiently elucidated, without ſo much as an attempt to accompliſh the other parts of the plan: Which may probably be at leaſt ſo far uſeful, as it will tend to give a check to the preſumptuous vanity of thoſe, who, through ignorance of the limited ſtate of our knowledge with regard to this art, are apt to think themſelves thoroughly acquainted with every

parti-

particular relating to it, when they have only got a ſlight ſmattering of the rudiments of it: For, it is imagined, that few perſons who ſhall take the trouble to peruſe theſe ſketches will be able to avoid perceiving, that it is hardly in his power to give ſatisfactory anſwers to many doubts that are there ſtarted, or to deny that it would be of great importance to the farmer to know them.

ESSAY

MISCELLANEOUS DISQUISITIONS

DOUBTS, AND QUERIES,

RELATING TO

AGRICULTURE.

In omnibus rebus, et maxime physicis, quid non sit citius quam quid sit dixerim. CICERO.

ESSAYS, &c.

MISCELLANEOUS DISQUISITIONS, DOUBTS, and QUERIES, relating to AGRICULTURE.

I.

IT can hardly be doubted, that ſome plants afford more nouriſhing food for certain domeſtic animals than others:—The well inſtructed farmer, therefore, ought to know which of all the plants that are, or may be cultivated by him, will ſooneſt fatten any ſpecies of animals that he may have it in his power to rear; as alſo, the comparative degree of nouriſhment afforded by each of theſe plants to each ſpecies of animals reſpectively. Wanted, on this account, an exact liſt of all the plants that will be eat by, and may be employ-

employed as food for cattle *, arranged in order, according to the degree of nouriſhment they will afford; beginning with thoſe that are moſt nutritive, and deſcending to ſuch as will hardly be eat by this claſs of animals, or that afford them only a bare ſubſiſtence? Wanted alſo, a ſimilar catalogue of plants with reſpect to horſes,—ſheep,—goats,—hogs,—rabbits,—geeſe, and every other ſpecies of domeſtic animal that could in any caſe become an object of the farmer's attention?

The benefits that would accrue to the farmer from the knowledge of the above mentioned particulars, are ſo obvious as hardly to need being pointed out; as it is evident, that

* Cattle is here employed as a general term, denoting all the animals of the cow or ox (Bos) kind.

that he would thus be made to know exactly, not only what kind of plant would be moſt proper for him to endeavour to cultivate in his own particular ſituation, but would alſo know, in what manner he ought to conſume any particular plant that chance or neceſſity might throw in his way, ſo as to make it turn out to his greateſt profit. Yet, the experience of every reader will eaſily ſatisfy him, that ſo far are we from having as yet attained the accuracy of knowledge required above, with regard to *all* the domeſtic animals, that we hardly as yet know the exact comparative value of any two plants, with reſpect to any ſingle animal; not even the favourite horſe himſelf, who has long obtained ſuch a particular ſhare of attention. It is, indeed, in general, known, that certain plants may, on ſome occaſions, be employed with profit for fattening ſome particular animals; but the exact proportional value of each has never, in any caſe that I have heard of, been

aſcer-

aſcertained by proper experiments, with that degree of preciſion which would be neceſſary in this caſe.

The only thing that approaches to this is, the attempt that the Swediſh naturaliſts have made in the *Pan Suecicus* (*Amoenit. Acad.* Vol. III.) in which they have, by a numerous ſet of experiments, endeavoured to diſcover what plants are eat or rejected by the five moſt common and moſt valuable kinds of domeſtic animals, oxen, ſheep, goats, horſes, and ſwine *. But, as it is by no means certain that animals always ſhow a preference for thoſe kinds of plants that afford them the moſt nouriſhing food, or the reverſe †; the plan that they have proceeded

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* See the Appendix.

† Although it may be preſumed that, in general, inſtinct points out to animals the plants that are hurtful to them, or the reverſe; yet experience ſufficient-

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ed upon in this valuable ſet of experiments, does not entirely anſwer the purpoſe here re-

ly ſhows, that this cannot be relied upon as an invariable guide—among domeſtic animals at leaſt; which, by having little freedom of choice from their infancy, have their taſte in all probability depraved as well as our own.—I have ſeen an ox that could not on any account be prevailed with to eat turnip; and there are very few put upon them, who do not eat them at firſt with ſome degree of reluctance, if they have not been ſometimes accuſtomed to taſte them before; yet, it is very well known, that few kinds of food are more nouriſhing or palatable to them, after they have been once accuſtomed to it. In the ſame manner, ſheep that have been accuſtomed to eat whins, (furze), browſe upon them at all times greedily, and prefer them to almoſt every other kind of food; whereas, others that have not been accuſtomed to this plant, will never touch it till they are reduced to the greateſt extremity by hunger: Although few plants, perhaps none, afford a more nouriſhing food for ſheep than this. The ſame might be ſaid of Burnet, Myrrh, and a great many other plants which are

required; nor affords us that degree of certainty in this reſpect that could be wiſhed for. Experiments, therefore, are ſtill here awanting. Nor can theſe ever in this caſe be concluſive, unleſs they are carried on upon a large ſcale, and ſo much varied, as to guard againſt the particular exceptions that might

are almoſt always refuſed at firſt by ſuch animals as have not been accuſtomed to them; although they are afterwards eat with a ſufficient reliſh.

And, if the reluctance that an animal may ſhow to eat any plant that may be offered to it, does not always indicate that it is unwholeſome, ſo neither does their eating it at firſt freely, afford a certain proof that it is innoxious. Thus, Linnaeus obſerves, That animals which have been accuſtomed to feed in the open fields are frequently hurt when carried into woodlands, by eating plants that are pernicious to them, which the cattle that had been bred in theſe laſt paſtures have learned by experience to avoid. Here, then, it is *experience* and not *inſtinct* that guards from danger.

might be occaſioned by particular idioſyncracies * or particular habits of body in the animals upon which the experiments have been made.

It would be no difficult taſk to point out ſuch a train of experiments, as if faithfully executed, would bring this particular to the certainty required. But, as it would require little leſs than princely munificence to execute that ſet of experiments properly, it is perhaps unneceſſary here to propoſe them. How much is it to be regretted, that this nation, which gives the moſt liberal encouragement to almoſt every other kind of im-

 provement,

* *Idioſyncracy* is a term uſed by phyſicians to denote certain peculiarities with which particular animals may be affected, that is by no means common to others of the ſame claſs. Thus, one man may have a natural antipathy at one kind of animal, or at one kind of food, which no reaſon can overcome, or length of habit reconcile. This is called an idioſyncracy.

provement, ſhould never have thought of applying a ſmall portion of the public money (and a very ſmall proportion would ſuffice) towards the proſecuting of ſuch national experiments in Agriculture as exceed the power of individuals to perform; and thus bringing certainty into an art the moſt uſeful, and eſſentially neceſſary to the exiſtence and well-being of mankind! The preſent inſtance is a ſtriking example of the real utility of ſuch an inſtitution.

II.

Hitherto the attention of the farmer has been too much confined to the common herbaceous plants that ſpring up in the fields, and are uſually eat by our domeſtic animals in their native ſtate.—Is it not probable that there may be many plants that do not ſeem at firſt ſight to be reducible to this claſs, that

that might be profitably cultivated as a crop, for food to ſome of theſe domeſtic animals? If ſo—What are they?

* * *

It is not neceſſary here to take notice of cabbages,—colewarts,—turnips,—the cole-ſeed plant, &c. which have been long known to be good kinds of food for cattle and ſheep, although they have only of late been generally cultivated as a field-crop by the Britiſh farmer.—I would wiſh here to turn the attention of the reader to the examination of ſome other plants that have not been commonly thought capable of affording good and wholeſome food for domeſtic animals.

The Myrrh plant * (wild Cicely or Cow-weed) is often ſeen growing in neglected corners

* *Chaerophyllum ſylveſtre.*

As plants have very different Engliſh names in different places, to prevent the miſtakes that might ariſe from

corners with great luxuriance early in the ſpring; and, in that ſtate, is ſeldom eat by any kind of animal, unleſs it be ſheep, which ſometimes crop it.—But it is not in general known that this plant affords one of the moſt nouriſhing kinds of food that can be found for cows and other ſorts of cattle, at a ſeaſon when few other green plants can be met with; and might undoubtedly be cultivated for that purpoſe with very great profit by the farmer.

The ſame might be ſaid of the *Epilobium* *: —A plant that grows with luxuriance upon ſome ſoils where few other ſorts can be made to thrive. The young ſhoots of the *Epilobium*, if cut before they harden too much, afford

from this cauſe, I ſhall ſubjoin the Botanical names of ſuch as are not univerſally known.

* *Willow-herb*, or French willow.

afford an abundant and wholeſome food for cows, at an early ſeaſon—before the common kinds of graſſes are fit for being cut, —as I myſelf have often experienced.

It has been diſcovered, of late, that the roots of carrots are readily eat by horſes, and yield them a plentiful nouriſhment.—Probably many other roots, that are now neglected, might be employed as a rich food for horſes, and other domeſtic animals.

Potatoes are well known to afford abundant nouriſhment to cattle—and horſes; and probably they would be equally nouriſhing to all the other domeſtic animals.

It ſeems alſo probable that the roots of the Myrrh plant, if ever it ſhould be extenſively cultivated as a crop, would be of very great value in this reſpect;—as cattle, when they have once been made acquainted with the taſte of this root, become extremely fond of it. The weight of roots of this

ſort

ſort upon an acre of ground, when full-grown, would be inconceiveably great.

Cattle are alſo extremely fond of the roots, as well as the tops, of the Carraway plant *, which might on ſome occaſions be employed for the ſame purpoſes.

Beets † were formerly more cultivated in our gardens than at preſent. Perhaps they ought to be chiefly valued as a food for cattle. They carry abundance of ſucculent leaves, which are readily eat by them;—but their roots, which uſed always to be thrown away, would be the principal crop as a food for cattle. They contain a larger proportion of ſaccharine juice than any other plant common with us. An ounce of grained ſugar has been extracted from a pound of the green root; and it is well known, that nothing fattens animals in general ſo quickly

* *Carum Carvi.*

† *Beta vulgaris.*

ly as plants that contain ſugar in large proportions.

Sheep ſeem to ſhow a greater fondneſs for the roots than any other part of many plants, and would probably be much nouriſhed by them, if we were at pains to ſelect ſuch plants for cultivating for other uſes as had roots that were peculiarly grateful to them, and the value of ſuch crops might be greatly augmented by this circumſtance.

Sheep are uncommonly fond of the leaves of the common dandelion *, and other plants of the ſame claſs ;—but they will leave almoſt any other ſort of food to ſearch for the *roots* of the dandelion among ploughed fields where theſe abound. They are alſo exceedingly fond of the roots of all the plants of the Hawkweed tribe †.

They

* *Leontodon taraxacum.*

† *Hieracium.*

They likewiſe ſearch with avidity for the roots of the common mugwort *.

And they are alſo very fond of the roots of graſſy leaved plantain †, which ſometimes grow to a conſiderable ſize.

Whether they, or ſwine, or any other domeſtic animal, would eat the roots of the *Epilobium*, which are extremely tender, and very numerous, I cannot ſay :—But, if they did ſo, it might be cultivated on many occaſions, by the farmer, with greater profit than almoſt any other crop.

I do not know if any uſe has hitherto been made of the roots of the Lucerne.—Theſe, where the crop has been luxuriant, are extremely large, and afford a ſaccharine juice, that would probably be very nouriſhing to ſome ſorts of animals. The roots are indeed tough and ſtringy in their natural ſtate ;—but,

* *Artemiſia vulgaris.*

† *Plantago minima.*

but, if mashed by a stone rolling about on its edge, like a tan-mill, or by any other contrivance, they would become tender enough for use.

The same might be said of *Sain foin* (*Saint foin vulgo*) roots. But, of these I speak less positively, not being so well acquainted with the nature of them.

But no plant that I am acquainted with promises to be more valuable in this way than the garden everlasting pea; the roots of which grow in time to a very large size, and are full of a rich saccharine juice, little inferior to the garden liquorice.

How these roots could be most easily raised out of the ground, might be inquired into, after their several qualities were fully ascertained.

Many other roots might be mentioned—some of which grow to an enormous size, and are just now accounted of no value, that might possibly be of great use as food

for domeſtic animals—All theſe deſerve to be examined, as ſome of them might perhaps admit of being profitably cultivated as a crop, and others, which, although they could not be thus employed, might ſtill be of great utility in ſupplying the deficiencies of a ſcanty crop, were they properly known.

Neceſſity has been, with ſome appearance of juſtice, called the mother of invention—and ſome perſons have ſo ſtrongly annexed the idea of want and poverty to every oeconomical experiment of this kind, that they would be aſhamed to be ſeen making them. Thoſe may reckon themſelves happy who are under no *neceſſity* of exerting their genius in this manner, and ought thankfully to avail themſelves of the *forced* experiments of the poor. But, it would be more for their honour, if they, with a liberal ſpirit of enterprize, made the diſcoveries for themſelves.—Many trials may prove abortive;—but, if one, among a great number, ſucceeds,

they

they may have the agreeable ſatisfaction to *feel* that they have not been entirely uſeleſs to their country, and poſterity :—Nor do they ſpring up on the face of the earth, and decay like the weeds of the field, that only incumber the ground for a ſeaſon—are trodden under foot, and ſoon forgot ;—or are only remembered with abhorrence and diſguſt.

In the northern regions of Norway and Lapland, the inhabitants are obliged to try many plants, as food for themſelves and cattle, which have been neglected by thoſe whoſe milder climate leaves them a greater variety to chuſe from. They gather the leaves and tender twigs of various ſorts of trees, which they carefully preſerve, inſtead of hay, for their beſtial, and find that it affords them as abundant nouriſhment as any hay whatever. Ought not this to afford us a hint not to neglect our own trees or ſhrubs ; ſome of which might be employed with profit,

fit, even by us, were their qualities ſufficiently known?

The moſt valuable hay that the Romans were poſſeſſed of, conſiſted of the leaves and twigs of a ſhrubby plant,—the *Cytiſus*.

And the experience of many perſons in the north of Scotland, as well as of ſome of the diſcerning few in England, has ſufficiently proved, that the tender twigs of the common whin *, (furze), when bruiſed, afford a more wholeſome and nouriſhing winter-food for horſes and cattle, than, perhaps, any other plant that has ever yet been diſcovered,—not excepting the Roman *Cytiſus* itſelf: Yet few experiments have been made to diſcover the moſt proper manner of cultivating this valuable plant.

Another plant, that might poſſibly be of uſe to the farmer in this way, is the common *Laburnum*. This is nearly allied to the

* *Ulex Europæus.*

the Roman *Cytiſus* in its botanical characters. Its leaves and tender ſhoots are very much liked by cattle; and it grows with ſuch a rapid luxuriance, when young, as ſeems to promiſe that a very great weight of hay might be obtained from an acre of ground under this crop.

It may, perhaps, appear a little extraordinary to ſome readers to hear of a propoſal for making hay from trees: Yet they have ſeen, that the only nation of antiquity, who made agriculture their particular ſtudy, followed this practice with ſucceſs.

Nor will this appear ſo extraordinary when nearly examined, as it may ſeem at firſt ſight. The ſhoots of this, as well as many other trees, are as tender, while young, and as entirely herbaceous as thoſe of clover, or any other of the moſt ſucculent graſſes; and, if theſe were cut while in that ſtate, might, perhaps, afford as nouriſhing hay as clover, or Lucerne.

The

The Lucerne plant, which affords, beyond any degree of compariſon, the moſt valuable hay that we moderns are acquainted with, if ſuffered to run to their full length for a whole ſeaſon, are more firm and woody than the ſhoots of the Laburnum at the end of the ſeaſon.

It is well known, that almoſt all ſorts of deciduous trees, when cut over cloſe by the ground, ſend out ſtrong and numerous ſhoots, which quickly attain a much greater magnitude than if the tree had been ſuffered to grow in its ordinary manner. The ſhoots of a willow, managed in this way, will often exceed nine feet in a ſeaſon, which would not have been above two or three if the ſtem had not been lately cut over.

I have often ſeen the ſhoots of a young *Laburnum*, in ordinary health, without amputation, exceed four feet in a ſeaſon :—If a vigorous ſtem had been cut over cloſe by the ground, theſe ſhoots would probably have been

been much above that length. Theſe young ſhoots are extremely herbaceous, and are covered cloſely over their whole length with numerous large ſucculent leaves, which, in figure, taſte, and ſmell, greatly reſemble thoſe of red clover *.

If,

* There are two ſorts of *Laburnum* common in this country, which may be diſtinguiſhed by the appellation of the *broad* and *narrow* leaved Laburnum. It is the firſt ſort I here allude to, in all that has been ſaid above.

The ſhoots of this ſort are long, irregular, and hang dangling on every ſide; the leaves are large, have long and weak foot-ſtalks, ſoft and pliable to the touch, and are of a light green colour, with a ſlight tinge of red on the young ſtalks. The flowers are ſmaller than thoſe of the other ſort, and the pods are flatted, with a ſoft pliable ſkin upon them.

The pods of the other ſort are hard, round, and ſomewhat knotty; the leaves ſmaller than the other, and of a darker Saxon-green colour, with ſhorter and ſtronger foot-ſtalks. The branches grow more erect, and are garniſhed with much fewer leaves.

This

If, then, a plot of ground were filled with the roots of this ſort of tree, and the ſtems cut over cloſe by the ground, a great number of theſe herbaceous ſhoots would ſpring up from every one of theſe ſtems, which might be cut over with a ſcythe at any time in ſummer, with as great eaſe as a crop of clover; and might either be made into hay, or conſumed green, as ſhould be moſt convenient for the farmer. Theſe ſhoots ſpring up much earlier in the ſeaſon than red clover, and might be cut once, twice, or thrice in a ſeaſon, as might beſt ſuit the purpoſes of the owner.

The roots would continue to encreaſe in ſize, and the annual ſhoots in vigour, for many

This ſort is a more beautiful tree, but would not anſwer the purpoſes here required near ſo well as the other.

Theſe trees, after they are ten or twelve years old, produce abundance of ſeeds, which ſpring up as readily as creſſes, if ſowed in a good ſoil.

many years, and yield ſucceſſive crops without any additional trouble or expence —if it ſhould be found, upon trial, that the hay or graſs (if I may uſe that phraſe) was of a valuable ſort.

Nearly the ſame thing might be ſaid of the common wood-bine, or honey-ſuckle *; ſome of the freeſt ſhooting, and moſt herbaceous ſorts † of which grow to a very great length in one ſeaſon; and, if managed in the ſame manner, would no doubt yield a prodigious weight of fodder. I find, that

* *Lonicera Periclymenum.*

† There is a very great difference in this reſpect among the different kinds of wood-bines. The wild ſort, with woolly leaves, and long thread-like ſtalks, would be very improper. The beſt ſort ſeems to be one that has thick and ſtrong ſhoots, of a greeniſh colour, with a tinge of red on one ſide, large bright-coloured, ſmooth, ſucculent leaves, and a large tuft of big-like flowers, yellow tinged with red on the outſide, which begin to open about the middle of June, and continue to blow till the end of the ſeaſon.

ſome cattle * eat the leaves and tender ſhoots of this plant without reluctance. Whether it would afford them a wholeſome nouriſhment, I have not had experience enough to ſay;—but there is no reaſon to think it would not.

Willows, and many other trees, afford long and tender ſhoots, which might poſſibly be of uſe in this way on ſome occaſions, were they properly tried.

This

* The reader ought to be informed, that there is a very great difference among cattle in this reſpect. Some cows, eſpecially thoſe that have been bred with gardeners, refuſe hardly any green thing; others can ſcarcely be prevailed with to eat any thing but common graſs. The beſt way to bring a beaſt to eat any kind of food it has not been accuſtomed with, is to make it ſtand near one which eats the kind of food you mean to give it. In a ſhort time moſt animals will be brought, in this manner, without conſtraint, to eat almoſt any ſort of food that others do.

This is a walk in agriculture that may be ſaid to be, in ſome meaſure, untrod. And, although theſe obſervations may, to ſome, appear whimſical, yet the ſubject does not, on that account, the leſs merit the attention of the liberal minded enquirer into the principles of rural œconomy.

III.

It is ſuppoſed, that ſome plants may not yield ſuch wholſome food for animals when green, as when made into hay; and that perhaps others, on the contrary, afford better nouriſhment as a green food than as a dry.——Wanted—An exact liſt of all our plants compared with one another in this reſpect, with regard to each of the domeſtic animals above named.

With

With regard to mankind, we know, that many plants, which, when green, are hardly fit for food, become extremely nouriſhing when dry;—and that ſome are even poiſonous in that ſtate, which afterwards become an agreeable and wholeſome food;—as the Caſſava-root. And, as the *virus* * of many plants depends upon a very volatile eſſential oil, that may be evaporated in drying the plants, as happens with regard to the root of the horſe-raddiſh †, it is extremely probable that the qualities of the ſame

* I have ventured to adopt this word, as I know no proper Engliſh word that is equivalent to it.—It is here employed to denote that particular power by which plants are enabled to produce any ſenſible effect upon the animal ſyſtem; whether this be ſalutary or pernicious.

† *Cochlearia Armorica.*

ſame plant may frequently be very different in a dried or a green ſtate. Till the farmer, therefore, is made acquainted with this particular, his knowledge is not ſo great as it ought to be; and he muſt be often at a loſs to know which plant he ought to cultivate for any particular purpoſe;—or which way he could conſume any particular plant to the greateſt advantage.

IV.

It is probable that ſome plants which may perhaps be poſſeſſed of the ſame qualities when green as when in a dry ſtate, may nevertheleſs be more properly and œconomically conſumed by cutting them green, and employing them in that ſtate, than by allowing them to be made into hay; and, in ſome caſes, perhaps the reverſe of this

may

may be the caſe. Wanted—A liſt of each of theſe claſſes of plants as above.

* * *

Great clover, and many other ſucculent plants, are with ſome difficulty made into hay; and, in all probability, may be conſumed much more profitably as a green than as a dry fodder. Becauſe, as ſoon as they are cut over, the plants quickly vegetate afreſh during the ſummer-ſeaſon; and, by being repeatedly cut over, produce a much greater weight of forage than if they had been allowed to bring their ſeeds to maturity. For it is obſervable, of almoſt all theſe ſucculent plants, that they puſh out very vigorous ſhoots ſoon after they are cut over, which advance with great rapidity until the plant hath attained nearly its full ſtature; after which period, it advances more ſlowly, till it at length becomes entirely ſtationary, and is ſolely employed about the formation

of

of its ſeeds. Now, if the plant be always cut when it approaches towards that ſtationary ſtate, it will be always kept in the ſtate of vigorous vegetation; and thus, it would ſeem, that a much greater quantity of vegetable matter would be produced, than if it were allowed to arrive at greater maturity before each cutting.

This is ſtill more apparent with regard to Lucerne than broad clover. This plant, if allowed to come to its full ſize, will, in a good ſoil, attain the height of four feet, or a little more, in one ſeaſon. But I myſelf have cut a plant of Lucerne ſix times in one ſeaſon, allowing it to be about twenty inches high before each cutting; which gives upwards of ten feet for the growth of one year;—conſiderably more than double the height that it would have reached if it had not been cut at all. And, although it be acknowledged, that the tender and more ſucculent ſhoots, obtained in conſequence of frequent

frequent cutting, would not contain ſuch a quantity of ſolid matter, as an equal weight of the better maturated ſtalks would have done; yet it does not ſeem at all probable, that the difference, in this reſpect, would nearly counterbalance the other. This is an object, among many others, that cannot be determined exactly without accurate experiments.

On the other hand, it would ſeem probable, that ſome of the Culmiferous plants * or graſſes, (gramina) properly ſo called, being leſs capable of recovering themſelves after being cut over, when the ſtalks have been allowed to advance to any conſiderable length, as is evidently the caſe with regard to common rye-graſs †, would afford but poor

* Culmiferous plants are ſuch as carry an erect hollow jointed ſtalk, as wheat, oats, rye, &c.

† *Lolium Perenne.* Properly perennial darnel-graſs, improperly called rye-graſs; as there is another plant,

poor returns if cut green, although they may yield a very weighty crop of hay if ſuffered to attain a proper degree of maturity. But, however great the probability is, that this may be the caſe, ſtill it is no more than a probability. Nor can the farmer hope to arrive at certainty in this caſe, till he knows, by accurate experiment, not only the exact qualities of each of theſe plants when green or dry, but alſo the quantity of each that can be produced upon the ſame ſoil with equally ſkilful management.

V.

Some plants that may be equally nouriſhing to animals, and that equally require to be conſumed green, may nevertheleſs differ

plant, *ſecale villoſum*, properly called rye-graſs, and has no other Engliſh name.

in this reſpect, that one claſs may be more œconomically conſumed by cutting the plants, and giving them by hand in that ſtate to the animals that feed upon them, while another claſs may be more profitably conſumed by being depaſtured by animals.—— Required—A liſt of each of theſe two claſſes of plants.

It will be, in general, allowed, that the two plants mentioned above, Broad-clover and Lucerne, are more advantageouſly conſumed when cut, and given green by the hand, than when paſtured upon. Probably this may likewiſe be, in ſome meaſure, the caſe with all quick-ſhooting ſtrong-ſtemmed plants, that do not grow cloſe enough at the root to form a firm bottom for animals to bite upon. It is likewiſe probable, that, in general, ſuch cloſe growing leafy graſſes as require

require to be conſumed green, and other weak ſucculent trailing plants, which run along the ground, and form a thick ſward there, but do not riſe quickly to a great height, ſo as to admit of being readily cut by the ſcythe, would be more profitable for paſturage.—But here again we are in the region of probability; nor do we as yet know, with any degree of certainty, either the different plants reducible to each of theſe claſſes, or the ſeveral limitations that, in particular circumſtances, might take place with regard to any of theſe.

On this ſubject, it may not be improper to take notice of a circumſtance that ought not by any means to be overlooked by thoſe who are obliged to ſupply the want of accurate experiments, by probable reaſoning from detached facts that accidentally occur—It is this: By accurate obſervations, any one may ſoon be ſatisfied, that if the flower-ſtalks of the greater part of culmiferous graſſes

graſſes are deſtroyed after they are fully formed, the plants do not attempt to form other flower-ſtalks that ſeaſon, but run afterwards chiefly to leaves, and ſpread by their roots. Now if, in this ſtate, theſe plants are allowed to remain for any conſiderable length of time, without being either paſtured upon or cut, the leaves gradually ſtop from growing,—remain after that for ſome time ſtationary, and then fade away, if they are not ſo luxuriant as to rot; and in this way the whole produce of a field may frequently amount to no more than a few inches in length in a ſeaſon. But, if theſe leaves had been cut over, or a-freſh bit down by the animals paſturing upon the field ſeveral times, the vegetation would at each time have been renewed, and it would have produced, perhaps, five or ſix times more, than if this repeated cropping had been omitted.

This

This I once had an opportunity of being ſatisfied of experimentally, with regard to two plants of ſheeps feſcue-graſs *, which grew upon the ſame ſoil,—were in equal health, and in every other reſpect alike when the experiment was tried. The leaves of each of theſe two plants, before the end of May or beginning of June, had advanced to about ſix inches in length, and after that remained quite ſtationary for ſome weeks: — Obſerving which, I cut off, with a ſharp knife, all the leaves of one of the plants quite cloſe by the ground; and, in a very few days, it puſhed out a ſet of freſh leaves with great vigour. Theſe were cut three or four ſeveral times during the remaining part of the ſeaſon, when about the height of three inches at each time; although it was not poſſible to remark the ſmalleſt encreaſe of one blade upon the other plant during all that time.

From

* *Feſtuca ovina.*

From this experiment, it would ſeem, that we might fairly draw the following obvious corollary, viz. That if graſs, in theſe circumſtances, is to be conſumed either by paſturing or cutting, it is the greateſt want of œconomy to allow it to remain long between each of theſe operations; and, if we mean to reap the full profit from the field, the oftener theſe are repeated, after the graſs is of a ſufficient length for a bite to the animals which may paſture upon it, or for the ſcythe to ſtrike it, ſo much the better.

From this experiment, we may farther infer, that it will be, in general, much more for the advantage of the farmer to conſume graſſes of this ſort by paſturage than by cutting. For, as theſe graſſes are always much cloſer at the roots than the top, when we attempt to cut them by the ſcythe, unleſs the field is as ſmooth as a bowling-green, a great deal of the cloſeſt of the pile will eſcape the edge of the ſcythe and be loſt.

And,

And, if theſe cuttings are frequently repeated, the proportion that this under ſtubble will bear to that which is above the ſcythe, muſt be at each cutting very conſiderable. And as the ſtems, when cut over, do not, for the moſt part, continue to advance afterwards, but die, and are ſucceeded by freſh ſhoots that ſpring up from the roots, all of theſe ſtubbles are entirely loſt; which, in theſe circumſtances, might perhaps amount nearly to one half of the whole produce of the field; a great part of which might perhaps have been ſaved, if the field had been judiciouſly paſtured upon.

VI.

As the value of any plant, conſidered as a food for animals, varies greatly according to the ſeaſon of the year when it is in perfection.—Wanted—A liſt of all the plants that could

could be moſt commodiouſly employed for food to each different kind of animal at each particular ſeaſon:—That is to ſay, of plants that are in the greateſt perfection in ſummer—or autumn,—or winter,—or ſpring.

The variations that take place with regard to the growth of plants at different ſeaſons, have been hitherto but too little attended to by the farmer; ſo that, were it not for the obſervations of the floriſt and botaniſt, we would be apt to think, that all plants were naturally diſpoſed to vegetate chiefly in the ſummer-ſeaſon; advancing always with a vigour in ſome degree proportioned to the warmneſs of that ſeaſon, if not deprived of a due degree of moiſture.

But the curious gardener knows well, that, however neceſſary the ſummer's heat

may

may be for bringing to perfection the greateſt part of the plants that he cultivates, yet there are other plants endowed by nature with ſuch particular powers of vegetating, as to grow with the greateſt vigour, ſome at one ſeaſon, and that alone, and others at another. Thus the common ſaffron plant begins to advance towards the end of autumn, —ſhoots up with vigour during the winter-ſeaſon, and, having attained its full length in the ſpring, gradually declines as the ſummer advances; and dies away entirely in the month of June, when the greateſt part of the plants we rear are in full vigour. The ſnow-drop,—vernal crocus,—tulip,—narciſſus, and many other bulbous rooted plants, advance early in the ſpring, and decline before mid-ſummer;—as alſo the common chickweed,—lambs-lettuce, &c. Carnations, and many other late flowering plants, remain inactive during the beginning of ſummer, and only advance haſtily towards per-

fection in autumn. The horſe cheſnut-tree makes its whole annual ſhoots in a few weeks on the firſt approach of ſummer, and has entirely ſtopped its progreſs for that ſeaſon long before the aſh or the oak have diſcovered the ſmalleſt ſymptom of vegetation: And this laſt, as well as the beech, after having made one ſhort ſhoot in the beginning of ſummer, ſtops entirely for ſeveral weeks, and then, towards autumn, begins anew to vegetate with much greater vigour than before.

Now, as we have remarked theſe variations in the ſeaſon of vigorous vegetation in theſe plants, Is it not probable, that ſomething of the ſame kind may take place with regard to ſome of thoſe plants that are, or may be cultivated by the farmer? And, it would ſurely be of importance for him to know all the peculiarities that take place, in this reſpect, with regard to the plants that it could be in his power to rear.

Some

Some of theſe he is already in ſome meaſure acquainted with, and employs for his own emolument,—particularly the turnip; which only grows in a proper manner during the latter part of ſummer,—in autumn, and in winter.——He knows that rye-graſs advances in the ſpring ſooner than clover, or the greateſt part of the other graſſes that he has been accuſtomed to obſerve; with a few other particulars of that ſort. But ſtill ſo much remains unknown in this reſpect, as to be out of all proportion to what he is already acquainted with.

The plants that advance chiefly during the ſummer-ſeaſon, and wither or die in winter, bear ſuch a great proportion to the whole, that the farmer's chief deſire ſhould be to diſcover ſuch plants as continue to vegetate late in autumn, or retain their verdure in winter, or advance very early in the ſpring: And, it is probable, that theſe may be much more numerous than is at preſent ima-

imagined. Although I have not had an opportunity of profecuting this fubject as I could wifh, the following hints may perhaps be of fome ufe.

It would feem, in the firft place, to be worthy the attention of the farmer, to examine all the evergreen perennial plants, with a view to difcover if any of thefe could be eafily cultivated, and profitably employed as food to any of our common domeftic animals. Among thefe, it is well known that the common whin, furze, or gorfe *, can be reared without any trouble, and that it furnifhes an exceeding plentiful and wholefome food for fheep during the winter and fpring. Nor is this plant lefs ufeful for horfes or cattle when it is properly bruifed; in which ftate, it is eat by horfes in preference to the beft hay or oats, and probably affords them as rich and wholefome nourifhment

* *Ulex Europaeus.*

riſhment:—And the fineſt winter-made butter that I ever ſaw, was obtained from the milk of a cow that was fed with bruiſed whins. Whether any other evergreen-ſhrubs might not, on ſome occaſions, be profitably employed for the like purpoſes, deſerves to be enquired into.

But ſhrubs and trees are not the only evergreen-plants that we are acquainted with; as pinks, and many other garden-plants, not to mention cabbages and other greens, retain their verdure during the winter. All ſuch plants, therefore, ought to be attended to with care, and accurate trials made of ſuch of them as could be profitably cultivated by the farmer. Cabbages have been of late much praiſed as an ineſtimable winter-food for cattle; and, although it is more than probable that the encomiaſts of this plant may be at preſent too ſanguine in their expectations with regard to it, there is little room to doubt but that this, or ſome

hardy

hardy kinds of borceole, may be found to be of real utility to the farmer, as a green, winter, or ſpring-food, for cattle, on many occaſions.

But it does not ſeem, that any of our culmiferous graſſes have as yet been ſuſpected of being poſſeſſed of any quality approaching to this in any degree: For, although it is well enough known that common rye-graſs, and many other ſorts of graſs frequently found in our fields and meadows, ſend out ſome freſh ſhoots during mild weather in winter, ſo as to aſſume a kind of verdure in rich grounds in a very ſhort time after the froſts are gone; yet it is as well known, that every leaf of this plant is quickly killed by any froſt, and that the verdure we at any time perceive in theſe graſſes, during the winter-ſeaſon, is always owing to a freſh vegetation from the roots. This happens to be ſo generally the caſe, that we have perhaps with too much precipitancy concluded,

that

that it is univerſally ſo; as I have good reaſon to believe, that there may be ſeveral ſpecies of graſſes whoſe leaves are only in part killed by cold, and ſome that reſiſt the ſevereſt winters we ever have in this climate, without being more affected by it than our common ever-green ſhrubs and trees.

This ſeems to be in a particular manner the caſe with regard to the otherwiſe valuable graſs called ſheeps feſcue; which firſt catched my attention by reaſon of the unuſual verdure of a tuft of it which chanced to ſpring up in the midſt of a field of other graſs: And having ſince ſown the ſeeds of it, I find, that this was not merely accidental; but that, if it is allowed to advance before winter to a conſiderable length, the leaves retain their verdure during all that ſeaſon, and might be employed, at any particular period during the winter or ſpring, as a rich paſture to any animal that could live abroad during that ſeaſon.—I had a ſmall

patch

patch of this graſs in winter 1773, which, having been cut in the month of Auguſt or September preceding, was ſaved from that period, and had advanced before winter to the length of five or ſix inches; forming the cloſeſt pile that could be imagined.—And, although we had about ſix weeks of very intenſe froſt with ſnow, and about other ſix weeks immediately ſucceeding that, of exceeding keen froſt every night, with frequent thaws in the day-time, without any ſnow, during which time almoſt every green thing was deſtroyed; yet this little patch continued all along to retain as fine a verdure as any meadow in the month of May:—Hardly a point of a leaf having been withered by the uncommon ſeverity of the weather. And, as this graſs begins to vegetate very early in the ſpring, I leave the reader to judge what might be the value of a field of graſs of this kind in theſe circumſtances.

Purple

Purple feſcue graſs * likewiſe retained its verdure much better than the rye-graſs during the winter-ſeaſon; but it had more of its points killed by the weather than the former. It likewiſe riſes in the ſpring at leaſt as early as rye-graſs.

Vernal graſs † ſeems likewiſe to reſiſt the winter-cold longer than many other graſſes:—As does alſo the creſted dogs-tail-graſs ‡, which ſeems to be ſtill more hardy than the vernal graſs. But, whether either of theſe can be conſidered as altogether evergreen, I cannot pretend as yet to ſay; not having had an opportunity of trying them properly by themſelves.

Common rye-graſs, as has been already ſaid, is altogether incapable of reſiſting froſt; and has its leaves killed down almoſt as ſoon as any other of our common graſſes. And, although it advances quickly in the ſpring,

* *Feſtuca rubra.* † *Anthoxanthum odoratum.*
‡ *Cynoſurus criſtatus.*

and furniſhes abundant food as a paſture at that ſeaſon ; yet, it has ſuch an irreſiſtible propenſity to run to ſeed, that it becomes, in a ſhort time, diſliked by all animals ; and is, at every other ſeaſon of the year, of little value as a paſture-graſs.

Soft graſs *, upon damp ſoils, is ſtill more early than rye-graſs ; and forms a much more valuable paſture-graſs in every reſpect.

All the tribe of *Poa* graſſes have their leaves entirely killed by a very ſlight degree of winter-cold—but they begin to vegetate pretty early in the ſpring.

But the earlieſt vegetable that I know, is the myrrh-plant †, (wild cicely or cow-weed), which ruſhes up in the month of March with amazing rapidity ; and may be cut twice at leaſt, if not thrice, before red-clover could be cut once. Cows, and other cattle, eat it very greedily, after they have been

* *Holcus lanatus.* † *Chaerophyllum ſylveſtre.*

been a little accuſtomed to it; although they do not always take it at firſt very readily.

It deſerves to be remarked, however, that this plant ſeems to be chiefly valuable in the ſpring, as it ſeems to advance more quickly then, and during the firſt part of ſummer, than towards the end of it.—About autumn its vegetative powers ſeem to be much abated.

In a few years, I ſhall be more able to ſpeak with certainty of the qualities and beſt methods of cultivating this and ſome other plants; as it requires ſome time to bring experiments relating to them to a proper period.

And the epilobium, or common willow-herb, may be employed for the ſame purpoſe, about the ſame early period.

Burnet * retains its verdure pretty well during the winter-months; but affords ſuch ſcanty

* *Pimpinella ſylveſtris.*

ſcanty crops, as hardly to be worth the attention of the farmer.

All theſe graſſes ſpring up early, and may be employed with moſt advantage as winter or ſpring-fodder. There are, however, others that do not make their appearance till late in the ſeaſon, but, on ſome accounts, may be deemed very valuable. Of this claſs is the common milk-wort *, and all the claſs of perennial peaſe and vetches; which ſeldom appear above ground till the month of May; but continue to yield a great burden of valuable graſs during the remaining part of the ſeaſon, till the winter froſts ſtop them. If theſe, therefore, were ſowed along with ſuch plants as either ſtand the winter, or advance early in the ſpring, the farmer would have it in his power to reap the benefit of his early paſture for his cattle or ſheep, without damaging his crop for the remaining

* *Aſtragalus glycyphyllos.*

ing part of the ſeaſon; as theſe would only begin to advance after the others were wholly conſumed. And, as moſt of theſe plants are equally proper for being cut and made into hay, or for being paſtured upon, it puts it in the farmer's power to employ them in either of theſe two ways that may beſt ſuit his conveniency.

I have not as yet been able to diſcover any plant that could be cultivated by the farmer which advances only during the winter-ſeaſon. But, as we as yet know little or nothing with regard to this article, it is to be hoped that future enquirers will make many valuable diſcoveries relating to it.

VII.

Some plants ſpring up quickly, and ſoon arrive at perfection, while others advance more ſlowly, and are long of attaining maturity:

turity :—Some periſh in a ſhort time, and others, when once well eſtabliſhed, remain almoſt for ever without decay. It would therefore be neceſſary for the farmer, who wiſhed to improve his ground to the utmoſt, to be acquainted with the natural period of exiſtence, if I may uſe that phraſe, of every plant that it might be in his power to cultivate. Required—A liſt of plants conſidered in this point of view?

* * *

Naturaliſts have already eſtabliſhed a few diſtinctions among plants in this reſpect ;—but theſe are by no means ſo far extended as the farmer would require. For almoſt all that they have done, is to reduce plants to the three general claſſes of annuals, biennials, and perennials ;—under which laſt head are arranged all thoſe plants which endure

dure more than two years. But the experienced farmer knows many plants that have but a ſhort period of life, although they exceed this term. Broad clover uſually laſts three or four years good; but ſeldom ſurvives that period:—And rye-graſs commonly laſts five or ſix years; but, for the moſt part, diſappears ſoon after that time:—Sainfoin (St foin vulgo) laſts from twelve to twenty years;—as does alſo lucerne in a favourable ſoil; but both decline at laſt and die away: Whereas milk-wort, and all the claſſes of perennial tares and vetches, ſeem to be perennial in the moſt extenſive ſenſe of the word;—as no period can be aſſigned to their duration. This is probably the caſe with many kinds of meadow-graſſes, altho' we are as yet ſo little acquainted with theſe, as not to be able to point them out with certainty.

VIII.

VIII.

Some plants grow beſt upon ground that has been lately in tillage, and diſappear after a ſhort time, if it is not again plowed up; and others only begin to flouriſh after the ground has remained ſeveral years in graſs. Required—A catalogue of all the plants that may be reduced to each of theſe claſſes?

✿ ✿ ✿

Common couch-graſs *,——knot-graſs †, and earth-nut ‡, only appear while the ground is in culture,—or, at moſt, for a year or two after it is laid into graſs; after which

* *Triticum repens.* † *Poligonatum aviculare.*
‡ *Bunium bulbocaſtanum.*

which they usually disappear, and are no longer seen till the ground has been again in tillage for some time. And, it is in this way alone that the farmers, in some of the worst cultivated parts of Scotland, know how to get rid of these destructive weeds. This is likewise the case with the common small-leaved sorrell *, mugwort †, and some other plants that are often found in fields that have been long kept under a bad kind of culture: —But these require a longer time to be fully eradicated, than some of the former plants. On the other hand, the common milk-wort ‡—yarrow or milfoil ‖,—sheeps-fescue, and several other kinds of grass, only appear after the ground has been for some considerable length of time in grass.

* *Acetosella.* † *Artemisia vulgaris.* ‡ *Astragalus glycyphyllos.* ‖ *Achillaea millefolium.*

IX.

It is always the caſe, that thoſe plants which fatten an animal moſt quickly, promote likewiſe in the higheſt degree the healthineſs and vigour of that animal? If they do not, Required—A catalogue of ſuch vegetables as tend moſt powerfully to promote the vigour of ſuch animals as are uſually employed by man for hard labour; ſuch as oxen, horſes, &c.

* * *

Thoſe who keep running horſes and fighting cocks, ſeem to be fully convinced, that great muſcular ſtrength and vigour of ſpirit, are often promoted by certain kinds of food that do not much encreaſe the fat of the animal.

nimal. In general, dry food ſeems to be leſs apt to produce fat than ſuch as is more ſucculent; while it has a greater tendency to produce ſtrength and vigour. Peaſe, and other Leguminous * grain, have a greater tendency to increaſe the quantity of fat and juicy fleſh than oats; although this laſt is, ſeemingly with good reaſon, ſuppoſed to promote muſcular ſtrength in a higher degree.—In Arabia, where the inhabitants beſtow a ſtill greater degree of attention upon their horſes than with us, they are ſaid to feed them with a paſte made of dates and camels milk; which contributes to make them active and vigorous, without enclining them to grow fat.—In Portugal, it is common to feed their horſes with cheſnuts, as theſe are cheaper than barley or oats; which is found to fatten them very quickly, although it does not inſpire them with ſo much life and vigour as

* Leguminous grain, is ſuch as is incloſed in a pod or capſule; as peaſe, beans, vetches, tares, &c.

as thoſe kinds of grain would have produced.—It is obſerved by Mr Kalm, that, in North America, the horſes are very fond of apples; but the inhabitants do not eſteem them a wholeſome food.—Carrots have of late been propoſed as a valuable feeding for horſes; but it is not as yet well known in what claſs they ought to be ranked with regard to the invigorating quality; although it is pretty certain that they fatten them readily.—Potatoes, likewiſe, have been employed, on ſome occaſions, for the ſame purpoſe, and are ſtill in the ſame ſtate of uncertainty.—Turnips are eat by ſome horſes; but how far they are either invigorating or wholeſome in other reſpects, is not yet ſufficiently aſcertained.—Bruiſed whins ſeem greatly to promote the health of this animal, at the ſame time that it fattens and encreaſes its ſtrength.—But, experiments are ſtill awanting to aſcertain with preciſion the comparative value, in this reſpect, of theſe and many other kinds of

of food that may be given to this moſt uſeful animal.

X.

Do ſuch plants as fatten an animal quickly, or tend in a high degree to excite ſtrength and animal-vigour, always and neceſſarily promote its health, ſo as to tend to prolong the life of the animal? If they do not, Required—A catalogue of ſuch plants as would, in the moſt effectual manner, tend to prolong the life of each ſpecies of domeſtic animals?

It would ſeem probable, that plants which tend too much to fatten the animal, would, in many caſes, engender diſeaſes that would ſhorten

ſhorten its natural period of life.—This ſeems to be pretty certainly the caſe with regard to ſheep; as it is found that theſe fatten more quickly in rich vallies, which produce abundance of luxuriant ſucculent graſs, than on higher ground, where the graſs is drier and firmer; although they can be made to live to a much greater age on the latter paſture than on the former. And, as it is probable the ſame thing takes place with regard to other animals, it might, on many occaſions, be for the benefit of the farmer to know with accuracy the diſtinction that takes place in this reſpect.

XI.

Some plants are noxious to one ſpecies of animals, which are wholeſome and nouriſhing to others. Required—A liſt of plants that are

are poiſonous to each ſpecies of domeſtic animals, arranged according to their degree of virulence:—Diſtinguiſhing thoſe that are more or leſs ſo at any particular ſeaſon; and comparing the effects that each may have upon other domeſtic animals?

✿ ✿ ✿

Long leaved water-hemlock * is poiſonous to cows; but wholeſome and grateful to the goat.—Monks-hood † is pernicious to goats; but not at all hurtful to the horſe.—Sheep, horſes, and cattle, are poiſoned by the broad-leaved kalmia ‡, which affords a grateful food to goats and deer. Parſley is deadly to ſmall birds; while ſwine eat it with ſafety:—And pepper is mortal to ſwine, and wholeſome to poultry.

Other

* *Cicuta viroſa.* † *Aconitum pyramidale.*
‡ *Kalmia latifolia.*

Other plants which are not entirely poiſonous, are, nevertheleſs, refuſed by ſome animals, although they are readily eat by others.—Horſes, cows, and hogs, refuſe to eat the common ragwort *, which is greedily devoured by ſheep, if they have acceſs to it in the beginning of ſummer, before the ſtalks are hardened.—Cows refuſe to touch the meadow-ſweet †, which is highly reliſhed by goats.—Horſes eat the water-mint ‡, —muſk-thiſtle ‖, and many other aquatic plants, which cattle refuſe to taſte;—and, on the contrary, horſes refuſe to eat angelica,—looſe-ſtrife §,—geranium, &c. that are freely eat by cattle.

The roots,—the leaves,—the ſtalks,—the flowers, and ſeeds of the ſame plants, are very often endowed with medical qualities

* *Senecio Jacobaea.* † *Spiraea ulmaria.* ‡ *Mentha aquatica.* ‖ *Carduus nutans.* § *Lyſimachia vulgaris.*

ties differing very much from one another; ſo that the ſame plant may be wholeſome or pernicious,—agreeable or diſagreeable to the ſame ſpecies of animals at different periods of its growth. Lettuce, while young, is a mild, agreeable, and wholeſome ſallad to man: But, when it arrives near maturity, its ſtalks contain an acrid milky juice that approaches to the nature of a poiſon.—Young nettles and mugwort are eat as an agreeable pot-herb by the country-people in the ſpring, but in a ſhort time become rank in taſte, and altogether unfit for that purpoſe.—Sheep greedily devour, and are nouriſhed by the ragweed when young, but reject it when full-grown.

Some plants, although equally noxious to animals when young, as when more advanced in growth, yet being then more tender, and leſs rank in taſte and ſmell than they afterwards become, are ſometimes eat at that ſeaſon, and prove fatal to the cattle that graze

the fields where they abound, although they are rejected with care at other ſeaſons. Linnaeus remarks, that the cattle which paſtured in the meadows, near Torneo in Lapland, died in great numbers in the ſpring, in conſequence of eating at that ſeaſon the tender leaves of *the long leaved water-hemlock* *, which they at other ſeaſons carefully avoided, and that therefore they then found the paſtures ſound and wholeſome.

The Yorkſhire ſanicle † is uſually eſteemed a poiſon for ſheep; on which account it has obtained its vulgar name *rot-graſs*. But ſheep never bite the leaves of this plant, as any one may remark who will carefully obſerve the plant at all ſeaſons, on fields where ſheep are allowed to paſture.—But I have ſome reaſon to ſuſpect that they eat the flower and ſtalk—ſo that *if it is at all* poiſonous to them, it is probably ſo at its flowering ſeaſon.

* *Cicuta viroſa.* † *Pinguicula vulgaris.*

ſon.—It grows on damp grounds, which uſually produce other plants that are unfriendly to ſheep, which may have helped to give this its name—as its leaves are more conſpicuous than thoſe of moſt other plants.

Numberleſs other plants are more palatable and nouriſhing to one ſpecies of animals than another, or more or leſs wholeſome or noxious to them at one particular period of their growth than another—But, as the farmer is not as yet in general acquainted with theſe, the loſs that is thus daily ſuſtained by the public is very great—ſo that it is of much importance to have this ſubject fully inveſtigated.

XII.

Are there any plants, that tend to promote the generative faculty of animals, and render them more prolific than others? If there are,

are, What are the plants that promote this in the higheſt degree with regard to each particular kind of animals?

* * *

It is remarked by all travellers, that the animals in Egypt are in general more prolific than in any other part of the earth; which is by them uſually aſcribed to the influence of the waters of the Nile; although I would rather be diſpoſed to believe, that ſome native plants of the country, joined to the mild temperature of the climate, tended to produce this effect.

XIII.

Are there any plants that have a natural tendency to excite animals to venery at any ſeaſon

ſeaſon that they may be eat? If there are, —What are the plants that produce this effect upon each particular ſpecies of animals?

* * *

Many reaſons occur to make it appear probable, that there are ſome plants endowed with this peculiar quality: And, altho' it would be of great importance to the farmer, on many occaſions, to know theſe; yet, if any of them are at all known to ſome individuals, that knowledge is by no means ſo general as it ought to be.

Thoſe farmers in England who are in the practice of rearing houſe-lambs, are ſaid to have it in their power to make the ewe take the ram at any ſeaſon they may incline, by making them feed upon ſome plants they keep for that purpoſe, commonly ſaid to be thyme, or ſome other aromatic plants. But,

as

as I never had an opportunity of being fully ſatisfied as to this fact, it is perhaps neceſſary to ſuſpend our belief of it till it is duly authenticated.

I have likewiſe been informed that, in ſeveral parts of Scotland, the inhabitants are in the practice of pulling a certain plant that grows upon uncultivated fields, that they diſtinguiſh by the name of *bulling graſs*; a handful of which they give to their cows at any time they wiſh them to take the bull; which, it is ſaid, never fails to produce the deſired effect. But, as I neither know if this fact can be certainly relied upon, or the name of the plant, it were to be wiſhed that ſome of thoſe who live in the place where this is practiſed, would take the trouble of informing or undeceiving the public with regard to this circumſtance.

XIV.

XIV.

The milk of domeſtic animals is of great importance to man; and, therefore, every particular that relates to it ought to be examined with attention. And, as it is well known that ſome plants make the animals that feed upon them yield a greater quantity of milk than others would have produced —Required—An exact liſt of ſuch vegetables as are endowed with this quality in the higheſt degree, with regard to each ſpecies of domeſtic animals?

Chickweed * is by many thought to cauſe cows give an extraordinary quantity of milk. —Spurrey, or yarr †, as it is called in ſome parts

* *Alſine media.*

† *Spergula.*

parts of Scotland, is thought by ſome to poſſeſs the ſame quality in an eminent degree; on which account, it is ſometimes cultivated in Holland as an uſeful plant, although it is here found to be a very pernicious weed. Cattle indeed prefer it, when green, to almoſt any other plant; and ſheep are exceedingly fond of it.

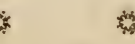
XV.

It is likewiſe probable that ſome plants may tend to make the milk thicker, and produce a greater proportion of cream than others do. If this is ſo—Required—A liſt of ſuch plants as produce this effect, compared with thoſe that promote the quantity of milk?

XVI.

XVI.

Some plants communicate to the milk of the animal which feeds upon them a very diſagreeable taſte, while others, on the contrary, give it a more pleaſant flavour.—— Required---A liſt of ſuch plants as produce the one or the other effect, with regard to each ſpecies of domeſtic animals?



It has been often remarked, that cows which fed upon certain paſtures, afforded butter of a richer and more agreeable taſte than could be obtained from other paſtures; which would ſeem to be occaſioned by certain plants abounding more in the one of theſe paſtures than in the other: Yet I have heard of no accurate experiment that has hitherto been made to aſcertain, with any de-

gree of certainty, what were the particular plants that either tended to debaſe it in the one caſe, or improve it in the other.

It is indeed true, that the taſte communicated to milk and butter, by ſome plants, is ſo exceedingly ſtrong and diſagreeable, that no perſon could avoid remarking it. Of this kind are turnip, which communicate to milk a nauſeous taſte, that is extremely diſagreeable to moſt people *. Wild garlick, hemlock,

* If the milk is to be uſed ſweet, this diſagreeable taſte may be conſiderably diminiſhed by boiling it. Other means of ſweetening milk have been attempted, that are more troubleſome and expenſive, and not more efficacious.

It may be of conſequence to remark, that, in general, that part of the milk that comes firſt from the cow when milked, is much more ſtrongly impregnated with any peculiar flavour than what comes laſt; and as that is alſo the thinneſt and leaſt valuable part of the milk, it may be taken away, and applied to any other inferior domeſtic uſe,

hemlock, and ſome other plants, likewiſe affect the milk with their own diſagreeable flavour.

But

uſe, without diminiſhing, in any ſenſible degree, the products of the dairy.

By thus ſeparating the firſt from the laſt drawn milk, the quality of the butter will be, at all times, very much improved, and the quantity hardly diminiſhed in any ſenſible degree. For I have found, by experiment, that a ſmall quantity of milk, that comes laſt from the cow, contains about ſixteen times more cream, than an equal quantity that comes firſt at the ſame milking,—and that the cream is alſo of an infinitely richer quality; the colour of the one being of a very deep orange, while that of the other is as white as the paper on which I write.

Hence we may infer, by way of corollary, that no method of rearing calves can be ſo beneficial for a dairy, as that uſually practiſed in the Highlands of Scotland, where it is the univerſal cuſtom to allow the calf to ſuck its mother for ſome time, and then drive it away, and milk what remains in the cows udder. By this means, the expence of

milking

But the moſt uncommon inſtance of this kind that has come to my knowledge, was a caſe that happened to a widow lady of my acquaintance, whoſe cows, at one particular time, yielded milk that was ſo ſtrongly impregnated with a peculiar kind of bitter taſte, that no perſon could uſe it in any way, which ſurpriſed her a good deal, as the cows had often been allowed to paſture on the ſame field, without having had their milk ſenſibly

milking is much abridged—the calves are ſuckled more kindly than by the hand—and the quantity of butter not much diminiſhed: But the greateſt advantage is, that the butter is thus rendered of the fineſt quality that could poſſibly be deſired. It has indeed been often remarked, that well made Highland butter is of the fineſt quality that can be found any where; but this circumſtance, which contributes ſo much to its perfection, has, I believe, been overlooked.

It deſerves to be noted, that there is not near ſuch a difference between the firſt and laſt drawn milk of an old calved cow, as of one that is but lately calved.

ſenſibly impregnated with that diſagreeable taſte. Upon examining into what might be the probable cauſe of that ſingular phænomenon, it was diſcovered, that, as the cows had been kept upon another field for ſome time before, the graſs upon this field had been allowed to advance pretty far without being cropt. And, as it was full of the rough-leaved dandelion *, which was then in full flower, it was imagined, the peculiar flavour of the milk was occaſioned by the cows cropping theſe flowers in greater quantities than at any other time; which appeared the more probable, as it was obſerved, that this bitter taſte was not perceived in the milk after the cows had remained in that field for a few days, when the flowers of this plant were almoſt entirely conſumed.

As

* *Leontodon hiſpidum.* This plant is ſometimes called hawkweed, and ranked by botaniſts under the generic name of *Hieracium.*

As I have not had an opportunity of trying any experiment that could aſcertain the truth of this conjecture, I would not deſire that it ſhould be relied upon as an undoubted fact; but, from the circumſtances above narrated, it ſeems extremely probable, that the flowers and flower-ſtalks of ſome plants are ſometimes endowed with qualities in this reſpect very different from thoſe of the leaves; which ought to afford a leſſon of cautious circumſpection to the experimental farmer.

Although it is by no means certain that plants, in all caſes, communicate the ſame flavour to milk, as that with which they affect our palate in their natural ſtate, yet, as we know that this ſometimes happens, it may perhaps, in ſome caſes, aſſiſt us a little in diſcovering ſuch plants as may probably affect it, either with an agreeable flavour, or the reverſe,—ſerving, at leaſt, to point them out as proper ſubjects for future experiments

p. 78

Tab. 1

Rough leaved Dandelion

J. Miller del

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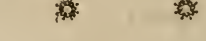
ments intended to elucidate this point. With this view, having chewed, at different times, many different kinds of graſſes that grow naturally in our fields and meadows, I was particularly ſtruck with the agreeable aromatic flavour of the common vernal graſs *, which ſeemed to approach ſo nearly to the rich almond-like flavour which is always obſerveable in the fineſt butter, that I reſolved to gather ſome of the ſeeds, and ſow them by themſelves, with a view to feed a cow for ſome time upon this plant by itſelf, to diſcover what effect it would have upon the flavour of the milk. The ſeeds are ſaved, and are ſowed; but it will neceſſarily be ſome conſiderable time before the reſult can be with certainty diſcovered.

XVII.

* *Anthoxanthum odoratum.*

XVII.

Some plants communicate to milk a rich yellow colour, and others render it pale, and almoſt colourleſs.——Required—A liſt of each of theſe claſſes of plants, with reſpect to all the different claſſes of domeſtic animals?



It is commonly imagined, that the butter which is of the deepeſt yellow colour, is alſo the richeſt in taſte:—And although it ſeems probable that this may be, in general, the caſe, and that many of the plants that anſwer the one of theſe intentions may anſwer the other purpoſe alſo; yet it is by no means certain, that theſe are not ſometimes diſjoined. For I have often met with butter

of

of a very rich flavour with little colour, and the reverſe; ſo that it would be of conſequence to the farmer to have a liſt of the plants poſſeſſing theſe two qualities ſeparately made out.

It is a vulgar prejudice, founded upon very inaccurate obſervations, that plants which produce yellow flowers, in general, tinge the butter with their own colour; than which, hardly any opinion could be more abſurd. Yet, upon no better foundation reſts the general prejudice in favour of paſtures that abound with the butter-flower *, which has evidently derived its name from that circumſtance; although more accurate obſervations ſhew, that, ſo far is it from being beneficial to cows, that they refuſe to taſte the plant, till they are reduced to the greateſt diſtreſs by hunger.

* *Ranunculus repens,—bulboſus.*

XVIII.

Probably ſome plants encreaſe the richneſs of the milk, but do not produce a proportional quantity of cream;—ſome certainly make it afford cheeſe of a finer quality, and probably in greater quantities than others. If ſo——Required—A liſt of ſuch plants as produce the fineſt cheeſe, as well as of thoſe that cauſe milk yield the greateſt quantity of it?

It has been often remarked, that if milk is of a very thick conſiſtence, the cream is not ſo perfectly ſeparated from it as if it were thinner:—That is, if water be added to it, more cream will be ſeparated from it than

than if it had got no mixture. But, in that caſe, both the butter—cream—and whey, are poorer in quality than if it had not been mixed. And as milk naturally thin, is nearly in the ſame ſtate as thick milk when mixed with water, it ſeems probable, that if any plant tends to render the milk thicker, it will not afford an additional quantity of cream proportioned to the richneſs of the milk *. But, if this is converted into cheeſe, we may expect that it would afford a greater proportion of curd, and that of a richer quality. For goats milk, which ſeparates no cream, yields a very large proportion

* In the laſt note, I have taken notice of the difference between the firſt and laſt drawn milk. After the whole of the cream was ſeparated from the laſt drawn, the milk that remained was thicker and richer in every reſpect than the cream of the firſt drawn. The milk of the firſt drawn reſembled water, coloured with milk—that of the laſt was thick like cream—and the whey of it, when made into cheeſe, was richer than the milk of the other.

portion of curd, as well as the richeſt whey: —Sheeps milk, which is likewiſe thick, and ſeparates little cream, comes next to it in both theſe qualities;—after theſe, in all thoſe reſpects, comes cow's milk;—and, laſt of all, the milk of mares and aſſes, which are thinner, and more watery than any of the others.

It may likewiſe happen, that ſome plants which cauſe butter have a very diſagreeable taſte, may probably yield cheeſe of an uncommon agreeable flavour; as we require a more acrid taſte in the laſt than the firſt. This ought, therefore, to be attended to.

XIX.

It is imagined, that ſome plants may communicate to the fleſh of animals that are fed upon them a peculiar kind of flavour, which may be in ſome caſes agreeable, and in o-

thers

thers the reverſe.—A liſt of the plants that tend to produce the one or the other of theſe effects, would therefore be a valuable acquiſition to the farmer.

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Turnips are uſually thought to communicate a ſlight kind of nauſeous taſte to the beef or mutton that has been fatted by them; and mutton that has been fed upon dry hills abounding with heather *, is commonly ſaid to have a peculiarly agreeable reliſh: But the fleſh of ſheep that have been fed upon mugwort †, is ſaid to be of a bitter taſte. The hogs that are fed upon the acorns that they gather in the woods of Germany and Poland, are reckoned to yield the fineſt bacon of any in Europe; and it is to this circumſtance that moſt people aſcribe the

* *Erica communis.* † *Artemiſia vulgaris.*

the ſuperior excellence of Weſtphalia hams, which have long retained their celebrity.—But the bacon of Virginia, where the hogs are fatted upon Indian corn, apples, and peaches, is by many deemed ſtill ſuperior to theſe;—and that which is fed upon grains or dairy waſh is reckoned much inferior to all of them.—But as it is not altogether certain, whether the difference in the quality of the meat produced in theſe different places is to be entirely attributed to the flavour communicated by the food, or if it may not, in ſome meaſure, be owing to the nature of the animal itſelf, or to ſome other circumſtance not uſually attended to; we muſt here, as in other caſes, wiſh for a courſe of accurate experiments.

XX.

As many unſucceſsful attempts have been made to introduce plants or animals from one

one country into another; and, as ſome attempts of this ſort have ſucceeded as well as could have been wiſhed for, even when they were brought from very diſtant countries, it would be of uſe to the farmer, before he attempted any thing of that ſort, to be made acquainted with the nature of the climate from which he intended to bring them, as well as the particular nature and œconomy of ſuch plants or animals as he wiſhed to encourage, that he might be able to give a probable gueſs before-hand, whether ſuch attempts could be attended with ſucceſs or not.

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The object enquired into in this diſquiſition may perhaps be deemed very unintereſting to the farmer; and yet, upon a nearer inſpection, it will probably be allowed, that, had this been duly attended to by philoſophical

phical promoters of agriculture, many improvements might have taken place in this art, with which we are as yet entirely unacquainted; and many unſucceſsful attempts have been prevented that have tended to diſtreſs individuals, and, of conſequence, to hurt the community. For theſe unſucceſsful attempts naturally tend to diſcourage others from trying experiments of the ſame kind, even where there may be a much greater probability of their being attended with ſucceſs. The following hints, therefore, tending in ſome meaſure to remove this difficulty, however imperfect, it is hoped, will be received with indulgence by the public.

Nature ſeems to have intended, that every climate ſhould be peculiarly fitted to produce thoſe ſubſtances that were beſt adapted to remove theſe diſeaſes, or guard againſt the inconveniencies to which it was moſt expoſed. Hence we find, that animals producing fur chiefly abound in cold regions;—

the

the cloſeneſs and fineneſs of the pile of theſe being always in proportion to the cold of the region they inhabit, or the rigour of the ſeaſon in which they are caught.—Siberia, and the northern parts of America, abound with animals that afford the fineſt fur, while hardly any of theſe are found in more ſouthern regions :—And the fur of the hare or rabbit is of much leſs value in the ſummer than winter-ſeaſon, when the cold is more intenſe.—Hence we may in general conclude, that it is highly probable that an animal which produces a thick and deep fur, will bear to be tranſported from one temperate region to another that is a little colder, without ſuffering much injury in its perſon ; and probably to the melioration of its fur.

But as countries that are raiſed to a great height above the level of the ſea are extremely cold, in proportion to others that are lower, it may often happen that a parti-

cular diſtrict, even in the torrid zone, may be, in ſome caſes, colder than one in the frigid zone.—The Andes of America, even under the line, are conſtantly covered with ſnow; whereas the heat at Torneo in Lapland is ſometimes ſo intenſe, as hardly to be ſufferable by man. Hence it may happen, that if a plant naturally grows, or an animal delights to feed in theſe elevated regions in equatorial climates, it may with good reaſon be ſuppoſed to be capable of being tranſported with ſafety to a much higher latitude,—unleſs in particular circumſtances.

To give an example of the uſe that may be made of theſe obſervations by the farmer —Let it be remembered, that, as the wool of ſheep is a particular and moſt valuable kind of fur, he has reaſon to ſuppoſe, that, like other animals of the ſame claſs, the ſheep is naturally fitted for cold climates; and that its wool will be meliorated by any degree of cold in which the animal can be made

made to live, and will be made worſe if it is kept in a warmer climate.—And experience ſhows, that, although ſheep live in the Weſt Indies, yet, inſtead of wool, which they formerly carried in Europe, they there only afford a thin coat of long coarſe hair, which again becomes wool after the ſheep is brought back to Europe.

Again—As the fleece is coarſer and thinner that grows in a warm climate, or during the ſeaſon of warm weather, than where it is colder, we may expect that the fineſt fleeces will be produced upon ſuch ſheep as live all the year round in a cold region, where there is as little variation of climate as poſſible. On the Andes of America, where there is little variation of ſeaſon, the wool, both of the ſheep that were carried from Europe, and of their own native ſheep, called Lama, and its varieties, is extremely fine.—In Perſia, where they drive their ſheep to the cool mountains in ſummer, and bring them

them to the vallies only during the winter, and thus keep them during the whole year round in a cool region; their wool is remarkable for its fineneſs, even to a proverb; —and in Thibet, a ſtill colder country, the ſpecies of goat called Touz, yields a ſtill finer fleece than the Perſian ſheep.——In Spain, where a ſimilar practice prevails as in Perſia, it is well known that they produce the fineſt wool in Europe. But in the northern kingdoms of Ruſſia, Sweden, and Denmark, where the ſheep are expoſed to violent heats during the ſummer-ſeaſon, they never had, nor probably ever will have, ſuch fine wool as can be reared in the foremen-tioned places. But, from our inſular ſituation, which moderates alike the heat of ſummer and cold of winter, Great Britain and Ireland enjoy a greater equality of climate than any continental country in the ſame latitude can do; and are, therefore, naturally fitted to produce finer wool than any of theſe,—

theſe,—with an equal degree of ſkill and care in the management of this moſt uſeful animal.

From the above induction, it would likewiſe ſeem probable, that the Lama,—Guanacoe, and Paco of America, which are never found in the low and warm regions;—the ſheep of Perſia, which conſtantly ſeek the cold mountains;—the goat of Thibet, and other animals of that kind, might be reared with ſucceſs in the climate of Great Britain;—although it is probable that they might be much hurt by the ſummer heats of more northern, or even continental regions.

On the other hand, theſe laſt named countries are naturally fitted to rear ſome products that our inſular ſituation would never permit us to cultivate with profit. Many perſons who have been in Holland,—Germany, or Ruſſia, during the winter-ſeaſon, where they experience a degree of cold far

greater

greater than is ever known in any part of Great Britain, fondly imagine, from this circumſtance, that every plant that can be brought to perfection in theſe, as they think colder countries, could be equally well reared in Britain ;—never adverting that, in the ſame proportion as their winter colds exceed ours, their ſummer heats are more intenſe. Hence we find, that vines can be reared on the continent to great perfection, and come to maturity in latitudes more northern than ours, although the many unſucceſsful attempts that have been made to cultivate that plant in this iſland afford the ſtrongeſt preſumption, that it never can be done here with profit, unleſs on ſome very peculiarly favoured ſpot.

The bee is an inſect, the active induſtry of which hath long been converted by man to his own emolument ;—but with different degrees of profit, according to the nature of the climate that he inhabits.—Endowed with a de-

a degree of inſtinct, that in ſome caſes ſeems to approach towards reaſon, this little animal, if tranſported to a Tropical region, where no viciſſitude of climate is ever experienced; as it can there at all times find food in abundance from the flowers that conſtantly ſpring up around its habitation, is under no neceſſity of laying up ſtores for the winter; and, therefore, lives from day to day on what it collects from abroad; ſo as to diſappoint the hopes of the poſſeſſor of the hive, if he wiſhes to make profit of the honey that they may have provided. But in Polar regions, where the rigour of the winter is ſo great as to prevent this delicate inſect from getting any food at that ſeaſon in the fields; with a wiſe forecaſt, it fills its hive in ſummer with a large ſtore of food to ſupply its wants during that rigorous ſeaſon;—which man greedily ſiezes for his own purpoſe. In vain, therefore, would the inhabitants of Equatorial regions hope to make profit of this ſurpriſing

priſing inſect ; while thoſe in a more northern climate may have a reaſonable proſpect of ſucceſs.

But this is not the only reſpect in which the climate has an effect upon this induſtrious and delicate creature. For, as it is benumbed by a moderate degree of cold, without being deprived of life; if the country in which it is placed does not experience a degree of cold ſufficient to produce this effect, while, at the ſame time, it is ſo intenſe as to kill the delicate flowers upon which it might feed, the animal is neceſſarily alive too long ; in which ſtate it muſt eat : And having thus in a ſhort time conſumed all its ſtores, it muſt inevitably periſh for want of food before the approach of ſummer. But, if the cold of the winter be ſufficiently intenſe and conſtant, it remains during the whole of that ſeaſon in a lethargic torpor ; in which ſtate it has no occaſion for ſuſtenance of any ſort : So that, when it is revived by the returning heat

heat of the ſpring, it finds abundance of food ſtill remaining in the hive to keep it alive and ſtrong till the flowers ſpring up, and the ſeaſon becomes mild; when it begins afreſh the labours of the year.

Hence it appears evident, that the climate of the continent, in which the heat of the ſummer and cold of the winter are alike intenſe and uninterrupted, is much better adapted to the rearing this uſeful inſect than that of an iſland; where the heat in ſummer is leſs conſiderable and the ſeaſon more variable; and where the cold in winter is often interrupted by ſudden gleams of heat that frequently bring the bees to life long before it is ſafe for them to go abroad in ſearch of food. For which reaſon, the inhabitants of Poland and Germany have naturally fallen into the practice of raiſing great quantities of honey and wax, which many in Britain have attempted with far leſs ſucceſs.

—Nor can it be expected that in our climate very great profits can be made of this insect; although it may be hoped, that, in time, the northern colonies in America will avail themselves of the advantages that their climate will afford them in this respect, as soon as their country shall be sufficiently cleared of wood.

From not duly attending to this variation that necessarily takes place between the nature of the climate of an extensive continent and that of a small detached island, many have been disappointed in their hopes of rearing several American trees and shrubs in Britain; and have been much surprised to find them killed by our winter's frosts, seeing they suffer every year, in their own climate, a degree of cold much more intense than we ever experience, without sustaining any damage from it.—But, although the winter's cold be there indeed much more intense than with us, it is likewise more invariable,

riable, and the ſeaſon in every reſpect more conſtant; ſo that there,—from the time that the vegetation is ſtopt in autumn, till it begins again vigorouſly in the ſpring, the ſap is never once put in motion;—whereas, in Britain, the mild weather that we frequently experience in the middle of winter, very often ſwells the buds at that ſeaſon, which gives them ſuch a tender ſenſibility as makes them unable to reſiſt the ſevere froſts that often follow; ſo that they, on this account, periſh with us entirely, although they were capable of reſiſting a much more intenſe degree of cold in their own native climate.

Many likewiſe have been much diſappointed, at finding the roots of certain garden-plants killed by the winter-froſts in Great Britain, which are ſeldom hurt by the much more intenſe cold that is experienced in Ruſſia and many parts of Germany, from whence we have endeavoured to introduce them; by not having ſufficiently adverted

to

to the difference of the two climates :—As in theſe cold continental countries, the earth is conſtantly covered with ſnow, from the beginning of winter, till the genial heat in the ſpring melt it; by which means, they are more effectually preſerved from the intenſe cold, than by any other covering that we could give them ;—inſomuch that graſs advances, and flowers ſpring up, under its protection, ſo as to appear in full bloſſom as ſoon as it is diſſolved.

From theſe obſervations, it appears evident that we cannot in all caſes promiſe, that a plant will not be killed by cold in one country, although it ſhould chance to be a native of one that is colder:—Nor can we always be certain, that a plant which comes to perfection in a temperate, or even Polar climate, will meet with warmth ſufficient to ripen its ſeeds, even in an Equatorial region. Thus wheat,—barley,—and other kinds of grain, that ruſh up with rapidity, and

ſoon

ſoon attain perfection in temperate climates, can hardly at all, or with great difficulty, be brought to ripen their ſeeds in the Torrid zone.—For, in theſe laſt regions, although the heat of the day is very intenſe, yet the length of the night that conſtantly ſucceeds it is ſo great, as tends much to retard the maturation of the grain,—at the ſame time that the copious dews that theſe long nights always produce in warm climates, is ſo greedily imbibed by the ſucculent leaves of theſe plants, as endows them with prodigious vigour to advance in length with the heat of the day; ſo that the plants are urged on to grow to a prodigious magnitude. And it is ſo long before the ear begins to be formed, that ere ever it can be brought to maturity, the tender ſtem becomes unable to ſupport the vaſt load that it has to carry; and the rainy ſeaſon approaches before the ſeeds can be ripened;—which effectually deſtroys the whole plant.—But in regions that are placed

nearer

nearer the pole, as the day is ſo much lengthened during the ſummer-ſeaſon, the night hardly gives any check to the vegetation at that time; and, as the dews are neceſſarily leſs abundant, the plant has not ſuch a tendency to an over luxuriance of growth; and the conſtant action of the ſun ſoon diſpoſes it to puſh out its flower-ſtalks, ſo that the ſeeds attain maturity with a rapidity unknown in theſe warmer climates.

Two countries that lie under the ſame parallel, and are in other reſpects alike, may yet differ from one another with regard to the production of certain vegetables, merely from the different form or poſition of theſe countries.—For if, from this circumſtance, one of theſe places that may be compared together, ſhould be more or leſs expoſed to ſevere winds, from any particular point of the compaſs, accompanied with rains, or the reverſe, at certain ſeaſons of the year, ſome particular vegetables may be benefited by this

this peculiarity, while others may be hurt, or totally deſtroyed by it: Therefore ſome plants may be found to thrive very well in the one country, which would periſh entirely, or languiſh in the other.

From this circumſtance chiefly, it has been remarked, that the climates of China, and of North America, reſemble one another very much, and that the plants which flouriſh in the one, proſper equally well in the other; theſe two countries being ſubjected to the ſame winds, at the ſame ſeaſons of the year, and to rains, cold, and heat, nearly at the ſame periods throughout the whole year.

From this cauſe, likewiſe, it happens, that the eaſt and weſt coaſts of Britain are not equally fitted for rearing the ſame kinds of plants to perfection. For, as eaſterly winds prevail much during the ſpring months,—bringing violent rains, accompanied with ſharp cold blaſts, or thick muggy foggs, the

vege-

vegetables that ſpring early are ſo much affected by theſe on the eaſt coaſt, eſpecially in the northern parts of the iſland, as to languiſh, or periſh entirely;—while the ſame kind of plants, on the weſt coaſt, proſper abundantly.

Hence, it is found by experience, that the eaſtern parts of Britain, eſpecially Scotland, are far worſe calculated for producing fruit of any ſort than the weſtern parts of the iſland.—For, the tender bloſſom, in the ſpring, is often nipped by theſe cold eaſtern blaſts, or ſuffocated by thick fogs, when they eſcape on the oppoſite ſide of the iſland.—For the ſame reaſon, trees of any ſort, or hedges, proſper better in general near the weſt than the eaſtern ſhore.

On the other hand,—from the violent and almoſt continued rains that fall during the ſummer and autumn on the weſtern coaſt, while that of the eaſt enjoys a clearer ſky and warmer ſun, the firſt is much leſs fitted for rear-

rearing abundant crops of corn than the laſt.—Their harveſts are later, and more precarious—Their fruit, although more abundant, is leſs perfectly ripened; and the country is better calculated, in every reſpect, for graſs or wood, than for crops of grain.

Their winters are alſo leſs ſevere,—the ſnow lies for a ſhorter time,—the ſummers more moderate in their heat; and the variations between the different ſeaſons are far leſs perceptible, for reaſons that are ſo obvious as need not be particularly pointed out.

By properly attending to theſe peculiarities of different climates, and to the nature and particular œconomy of the plants or animals that he wiſhes to rear, a man may have a tolerable gueſs whether or not he may hope for ſucceſs in rearing plants in one country that are brought from another.—Thus, it will readily occur to any perſon in the leaſt verſant in this ſubject, that it would be in vain to expect to be able to rear

any of the trees peculiar to Equatorial regions in the open air, within or near the Polar circle. Becauſe, as there is almoſt no variation in the heat of different ſeaſons in the firſt named regions, it is probable, that ſuch perennial plants as are natives of it would be incapable of bearing any conſiderable degree of cold, which they cannot fail to meet with in the laſt named regions; ſo that there is the greateſt reaſon to think they would all be killed at the very firſt approach of winter.

But there is not ſo much reaſon to deſpair of being able to rear to perfection, in high latitudes, ſome annual plants that may be natives of Equatorial countries. For, if theſe plants require but a ſhort time to attain perfection in their native climate, it is not at all impoſſible but they may ripen in the other during the ſummer-ſeaſon, before the cold weather of autumn approach to kill them. And, accordingly, we find that ſeveral annual flowers from theſe regions have been intro-

introduced with ſucceſs into our gardens; and probably other uſeful plants, if equally attended to, might have been cultivated by us with equal ſucceſs.

The potatoe, which has of late been reared with ſuch happy ſucceſs in all the northern parts of Europe, ſufficiently evinces the juſtneſs of this remark: For it is a native of a very warm climate, and is as impatient of cold as almoſt any plant we know;—yet, as the length of our ſummer ſufficeth to bring it to perfection before the froſts approach, we are enabled to cultivate it with the greateſt advantage. Whether the yam, another Weſt-Indian root, nearly approaching to the nature of the potatoe, could be reared with the ſame facility in Europe, ſeems to me a little doubtful; as it requires a longer time to arrive at perfection in the Weſt Indies than the potatoe. But, it is probable, that many plants whoſe value conſiſts in their leaves, and not a few whoſe roots or ſeeds

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are moſt eſteemed, could on ſome occaſions be introduced with ſucceſs into Europe or the American continent, were the peculiarities of their growth duly pointed out, and ſufficiently attended to.

But, it is not in all caſes enough for the farmer to know that plants will live in the country he inhabits. Before he attempts to rear them, it is likewiſe neceſſary that he ſhould know, if his ſituation is ſuch as, with an ordinary degree of care, puts it within his power to attain all thoſe peculiarities that ſeem to be neceſſary for the well-being of that particular plant he means to cultivate. For a diverſity of climate often produces a much greater variation in this reſpect, than moſt people ſeem to be ſufficiently aware of.

Thus, in warm countries, ſuch as Portugal, Spain, and Italy, the heat of the ſun becomes ſo intenſe during the ſummer-months, that all the common ſuperficial fibrous root-

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ed graſſes are totally deſtroyed ; ſo that the common paſture graſſes are withered, and the fields become bare and parched up at that ſeaſon, unleſs where artificially watered ; inſomuch, that the inhabitants are often, from this cauſe, ſubjected to great inconveniencies for want of food to their beſtial. It was therefore an object of the utmoſt importance to them to diſcover a plant, that could be made to live and thrive at that particular ſeaſon, and furniſh an abundant and wholeſome food to their domeſtic animals.

Such a plant they have happily diſcovered in the Lucerne ; which, by ſending its roots to a great depth in the ſoil, continues to find there moiſture ſufficient to preſerve it in a degree of vigorous vegetation when all the common graſſes are totally deſtroyed. No wonder, therefore, that the inhabitants of theſe countries ſhould conſider this as one of the moſt valuable bleſſings that heaven, in its abundant bounty, hath beſtowed upon them,

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and never have done with its praiſes.—But, in our more temperate climate,—as we do not ſtand in ſuch need of a plant of this ſort; ſo neither do we find ourſelves in a ſituation that admits of the culture of it with ſo much advantage. For, here the moderate heat of our ſummers, and the frequent gentle ſhowers that we then have, are ſo exceedingly favourable to the growth of the common fibrous rooted graſſes, that every unoccupied ſpot becomes quickly covered with them; and they ſpring up ſo cloſe upon one another as to choak every other plant that is not ſo hardy and luxuriant as to overtop and deſtroy them.—Now, although it is found that the Lucerne plant will live and thrive extremely well in our ſoil and climate, if it be kept free from theſe numerous weeds; yet, it is by no means capable of deſtroying, without aſſiſtance, that immenſe quantity of graſſy plants that conſtantly ſpring up around it here, and ſtint it in its growth, and

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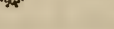
at length totally deſtroy it, unleſs we are at pains to free it from this its moſt deſtructive enemy; which adds very much to the trouble and expence of cultivating the plant in our climate, and prevents us from having it in our power to rear it with ſucceſs in that eaſy promiſcuous way of ſowing it, that may with ſafety be practiſed in thoſe climates where nature performs the part of the gardener, and frees it more effectually from this particular weed, than any care or trouble with us could ever effect.

XXI.

Is there any method of preparing the food of animals ſo as that it may be made to afford them a better or more abundant nouriſhment than in its native ſtate? If there is,—What are the rules that ought to be obſerved in this reſpect, with regard to every ſpecies of aliment that may be thus im-

improved, as applied to each ſpecies of domeſtic animals?



As ſeveral plants that might be employed as food for domeſtic animals, are of a texture too firm to admit of being eaſily chewed by them; whatever tends to reduce them to a finer ſtate may probably be of uſe.—Thus, before furze can be properly given either to horſes or cattle, it is neceſſary to reduce them to a ſort of pulpy ſtate, by bruiſing them.—Straw, on account of its toughneſs, is the better for being cut;—and probably it is chiefly on account of the facility with which the animal can chew it, that it affords a more abundant nouriſhment in this condition than in its native ſtate.—Oats are firm and ſmooth; and are, therefore, in danger of being ſwallowed whole, if given by them-

themſelves, and thus paſſing through the animal without benefiting it in the leaſt; to prevent which, ſome mix them with chopt ſtraw, and think they derive very great profit from this practice:—But others have of late fallen upon a much better method of effecting this purpoſe, by making the oats paſs between two ſmooth rollers ſet cloſe upon one another like thoſe employed for bruiſing malt; which reduces them to ſuch a ſtate, that, with very little manducation, allows the whole of the nouriſhment that theſe can afford to be extracted in the ſtomach of the animal.—Slicing of turnips may likewiſe be of uſe in this reſpect; but maſhing or bruiſing them, ſo as to reduce them to a kind of pulp, would anſwer this purpoſe much more effectually, and could be performed with much greater eaſe.

But, beſides this mechanical ſort of comminution, that may be attended with ſome advantages on many occaſions, it is probable that

many kinds of food might, by other operations, be rendered more wholeſome or nutritive to particular animals. The experience of man, with regard to his own food, ſufficiently demonſtrates, that the qualities of almoſt every ſpecies of vegetable aliment are conſiderably altered by coction, or otherwiſe readying by means of fire; and, as their qualities are thus changed from what they were in their native ſtate, it is to be ſuppoſed they might, on ſome occaſions, be rendered more nutritive for certain animals, after having undergone ſome culinary proceſs *, than in their crude ſtate. Accordingly, we find that many farmers adopt this practice, with regard to particular ſubſtances.—Beans and peaſe are oftener boiled than given raw to horſes;—and when cattle are fatted with this

* Culinary proceſs is a general term for denoting any operation performed upon aliments by the aſſiſtance of common fire.

this grain, they are almoſt always given in this ſtate. Hay, when maſhed with warm water, or ſlightly boiled, is reckoned much better for cows than in its dry ſtate.—Potatoes, when given to horſes, are uſually boiled;—and it has been alledged of late, that hogs are fatted much more quickly, and to greater perfection, on this root, if roaſted, than if it were either boiled or given in its crude ſtate.—But, in all theſe caſes, different perſons are of different opinions;—nor do we as yet know that any *deciſive* experiments have been tried, ſo as to aſcertain, *in a ſatisfactory manner*, whether theſe practices are really beneficial to the farmer or not; or the exact degree of profit or loſs that he would in any caſe ſuſtain, by following the one or the other of theſe practices.

It is likewiſe poſſible, that certain plants may, on ſome occaſions, be meliorated by other proceſſes. The caſſava root, by being ſteeped in water, and afterwards hard preſ-

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ſed, is changed from a very poiſonous ſubſtance, into a very nouriſhing food for man. All farinaceous * grains and roots, by malting are converted into a ſaccharine ſubſtance, capable of being fermented, which they were utterly unfit for before :—And, as it is well known, that nothing is ſo nouriſhing or fattening to animals in general, as ſaccharine juices, it is not impoſſible but that, by this operation, ſome of theſe might be conſiderably improved as a food for ſome of the domeſtic animals.—Other methods of improving vegetables in this reſpect, may perhaps be diſcovered that have not as yet been thought of.

XXII.

Is there any way of compounding different kinds of food for domeſtic animals, ſo as

* Farinaceous is a general term, denoting all ſuch vegetables as afford a meally-like ſubſtance ; as wheat, oats, barley, rye, peaſe, potatoes, &c.

as that their effect, when thus compounded, ſhall be greater than if they had been adminiſtered ſeparately? If there is,—What are the kinds of food that may be in this manner improved, or have their virtues increaſed, by being given to an animal along with others?—The manner in which they ought in theſe caſes to be adminiſtred—Whether they ought to be mixed together or given ſeparately?—What are the moſt advantageous proportions of each, or in what order of ſucceſſion ought they to be adminiſtered to each ſpecies of animal, ſo as to produce the greateſt effect?—or, are there any kinds of food that, by being given to any domeſtic animal mixed together, or in immediate ſucceſſion, tend to produce a contrary effect, by yielding to the animal, in this manner, leſs nouriſhment than if they had been given ſeparately?—What are they?

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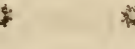
Phyſicians affirm, that the effects of different kinds of medicines upon the human frame, are increaſed or diminiſhed if given along with others:—Nor is it at all improbable, that this may be the caſe with different kinds of food upon brute animals; although our obſervations have not yet been ſufficiently accurate with regard to them, as to have enabled us to remark, with any degree of certainty, if this really is or is not the caſe.—Yet, it is generally imagined, that oats given to horſes along with graſs, or any other green food, are leſs beneficial to them than at other ſeaſons.—Experiments here are much wanted.

XXIII.

XXIII.

Are there any ſubſtances that, by being employed by way of condiment along with the food of animals, would tend to make that food produce a greater effect than if it had been given alone? If ſo—What are they,—and how ought they to be moſt efficaciouſly employed with regard to each ſpecies of animals?



It is pretty certain that common ſalt is, on many occaſions, agreeable to animals in the ſtate of nature;—nor is there much doubt but that it may be often adminiſtered to domeſtic animals with ſucceſs; which probably acts in no other way but as an agreeable condiment, that may prepare the body to receive

ceive the full effect of the food that is given along with it,—help the digeſtion thereof, or make it be eat with a more agreeable reliſh.—In North America, there are found, in many places, ſtrata of earth impregnated with ſaline matter, which the deer and other wild animals diſcover of themſelves; to which they frequently reſort to lick the ſaline earth with their tongue. If a huntſman diſcovers one of theſe *licks*, as they are there called, he never fails to make profit of it, by concealing himſelf near the place, and ſhooting the animals that come ſucceſſively to gratify their palate with this agreeable refreſhment.—In Spain, and many parts of France, they give to their ſheep a conſiderable quantity of ſalt, which they imagine tends both to fatten and preſerve them in good health; but, it is ſaid, they do not find it neceſſary where the ſheep feed upon chalky or lime-ſtone paſtures.—In England, it is well known, that animals fatten more quickly

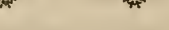
quickly on ſalt marſhes than any where elſe, —From all theſe circumſtances, it would ſeem probable, that common ſalt is, in general, an uſeful condiment, and might poſſibly be employed on many occaſions with profit in feeding domeſtic animals.

Other ſubſtances that promiſe to be equally efficacious in this reſpect have not as yet been attended to.—Nor have the effects of this ſubſtance been aſcertained with any degree of preciſion.

XXIV.

Is there any method of treating animals, in general, ſo as to diſpoſe their bodies to imbibe a greater degree of nouriſhment from the food that is given them, than they would have done if managed in a different manner? If there is—What is the moſt

proper method of treating each ſpecies of domeſtic animals, conſidered in this point of view?



It is, in general, allowed, that frequent and moderate bleeding of any animal put up to feed, diſpoſes it to fatten more quickly than it would do if that were omitted. It has been likewiſe often obſerved, that keeping cattle dry in winter, and in a moderately dark place, tended much to produce the like effect:—But it ſeems to be of ſtill greater conſequence to keep them in an equal temperate warmth, which, on many occaſions, will operate as much as a conſiderable quantity of food would do without it.—But what is the moſt proper degree of heat for each ſpecies of animals, has not as yet been attempted to be aſcertained.—Currying or combing ſome animals likewiſe tends greatly

greatly to promote their health, and bring them forward in feeding; particularly the horſe. But, how far it might be beneficial to others, hath not yet been enquired into.—Caſtration of males tends to meliorate their fleſh, and to make them fatten more quickly: And it is, in general, obſerved, that females, when with young, fatten more quickly than at any other time. But, how far they may be allowed to advance in their pregnancy before it becomes detrimental, requires as yet to be enquired into.

XXV.

Does that mode of treating any animal that tends to make it fatten quickly, at the ſame time tend to encreaſe the quantity of milk? If there is any difference in this reſpect—Wherein does it conſiſt, as applied principally to cows, and other domeſtic animals that are chiefly of uſe to us on account of their milk?

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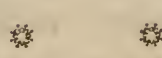


It would ſeem probable, that the ſame mode of treatment would often anſwer both of theſe purpoſes,—although there is ſome reaſon to think, they may not, in all caſes, coincide.—Warmth in winter cauſes cows give more milk, as well as fatten more quickly, than they would do if deprived of it.—The ſame may be ſaid of proper dryneſs, cleaning, &c. But it is univerſally allowed, that bleeding a milch-cow tends to diminiſh the quantity of milk;—and it alſo gradually decreaſes in quantity as their pregnancy advances, till they are very near the calving.

Whether ſalt promotes the quantity of milk in the ſame proportion that it tends to fatten, will probably be known by thoſe who have had the experience of ſalt-marſhes.

XXVI.

XXVI.

Does a difference in the nature of the paſture or food of the animal produce any change upon the *quality* of the wool of ſheep, or the hair of other animals, independent of other circumſtances? If it does —What are the changes produced by this means?

* * *

It is, in general, believed, that particular paſtures are peculiarly favourable for producing fine wool; and that improvements, by clover and other artificial graſſes, tend to improve the quality of this valuable commodity;—although it ſeems to me, by no means certain that this fact is ſo well eſtabliſhed by experience, as to deſerve to be

be implicitly relied on.—The countries that produce the fineſt wool do not always afford the richeſt paſtures.—Neither the mountains of Perſia, nor thoſe of Spain, produce graſs nearly ſo rich as many parts of Europe that afford wool of a much inferior quality.—In England, the paſtures of Cotſwold and Leominſter, have nothing peculiar to themſelves that may not be met with in many other parts of this iſland; ſo that we may juſtly doubt if it is owing to this circumſtance that the wool of theſe places has been ſo long diſtinguiſhed for its ſuperior quality above that of other parts of the country.—It is not more than a hundred years ſince it became common to cultivate clover and other artificial graſſes in Britain; and we have no reaſon to think, that the quality of our wool has improved ſince that time, but rather the reverſe.

Neither does it ſeem at all probable, that richneſs of paſture tends to debaſe the quality

lity of the wool,—ſeeing the ſheep of Lincolnſhire, of the Iſle of Wight, and of Romney-marſh, which feed upon rich deep graſs, yield fleeces of an exceeding fine quality; although the fine ſheep of Buckinghamſhire, that feed upon equally rich paſtures, and become as fat as any of theſe, always afford wool of a much coarſer quality.—But, whatever effect the nature of the paſture may have in altering the fineneſs of the pile of the wool, there ſeems to be little doubt but that abundance of food is neceſſary to give it its full ſtrength and firmneſs; as it ſeems to be univerſally allowed, that a very lean ſheep never yielded a fleece of wool of the very beſt quality, with reſpect to ſtrength and ſoftneſs, whatever may be the caſe with regard to fineneſs of the ſtaple. This ſubject is of much importance, and deſerves to be fully inveſtigated.

XXVII.

XXVII.

Does the nature of the climate alter the quality of the wool of ſheep? If it does—What are the changes produced by this means?

* * *

It is a prevailing opinion with many, that fine wool can only be produced in mild climates, rather approaching to warmth than the oppoſite extreme; which has, in like manner, in all probability been adopted precipitately, before the ſubject was duly inveſtigated.—Reaſon would make us rather expect that the contrary would be the caſe; and experience ſeems to confirm it, as appears N° XX. p. 86, to which I refer the reader. The ſubject is of great importance, and,

and, therefore, ought to be diſcuſſed with all the coolneſs and circumſpection imaginable.

XXVIII.

Does the fineneſs, or any other quality of the wool, vary with the age of the ſheep;—or is the weight of the fleece encreaſed or diminiſhed by a difference in this reſpect?

* * *

The price of wool is ſo low in Britain, and the value of the fleece here bears ſuch a ſmall proportion to that of the carcaſe, that leſs attention has been beſtowed to the circumſtances that may vary it, than the importance of it to the country in general would ſeem to deſerve; we have, therefore, ſo few opportunities of ſeeing old ſheep,

that our experience can only furniſh grounds for ſlight conjectures on this head.—Probably more ſatisfaction could be obtained from Spain than any other country at preſent, with regard to this and the other diſquiſitions relating to wool, as it has been long a ſtaple commodity with them, and almoſt the only vendible produce of their flocks; ſo that it muſt neceſſarily have claimed a great ſhare of their attention.—It ſeems, however, to be in general allowed, that the weight of the fleece diminiſhes with the age of the ſheep, after a certain period.

XXIX.

Is there any mode of management that would tend to make a greater *quantity* of wool be produced upon the body of the ſame ſheep, than there would have been if it

it had been treated in another manner? If there is—What is it?

* * *

The French have of late beſtowed a very particular degree of attention upon their woollen manufactures, and have ſpared no pains to meliorate their wool and improve their breed of ſheep. By an experiment, conducted under the direction of the Intendant of Normandy with this view, it appears, that ſheep which are kept all the year in the open air, yield fleeces about one fourth part more weighty than the ſame kind of ſheep that were kept at night, and in bad weather, under a covered fold; and the wool of the firſt was likewiſe of a much better quality in every reſpect.—Whether any other mode of treatment tends to produce a ſimilar effect deſerves to be enquired into.

XXX.

XXX.

Can the quantity or *quality* of the wool be improved or debaſed by any particular mode of managing the ſheep, or by applying any particular ſubſtances to the ſkin of the animal while the wool is growing? If it can—What are the circumſtances, or the ſubſtances that produce this effect?

In every ſheep-country there are many *noſtrums* and particular recipies handed about, or generally adopted, which are believed to contribute to the improvement of the wool in ſome of the ways above mentioned. But theſe are, in many caſes, ſo evidently uſeleſs, and ſeem, in general, to have been adopted with ſo little reaſon, that an

an enumeration of ſuch of them as may have come to my knowledge would be only tireſome to the reader; for which reaſon they are here omitted.—A judicious experimental philoſopher, however, who would inveſtigate this matter in a proper manner, and elucidate the ſubject by deciſive experiments, would do an eſſential favour to his country;—as, in all probability, our future ſucceſs in the woollen manufacture will depend upon our attending more particularly to the article of wool than we have done for more than a hundred years paſt; during which period there is very great reaſon to ſuſpect, that the quality of the wool in England, inſtead of growing better, has become ſenſibly worſe; while that of our neighbours on the continent has been greatly improved.

XXXI.

XXXI.

At what age can animals of each particular claſs be fattened with the greateſt facility; and at what period of life is the meat of each kind in the higheſt perfection, ſuppoſing it to be equally fattened?

* * *

While animals are young and growing vigorouſly, as a great proportion of the food they eat goes towards encreaſing the ſize of the body, it is natural to expect that theſe will be with more difficulty brought into full fatneſs, than thoſe which have previouſly attained their full ſtature; but, if the fleſh of theſe young animals is much eſteemed, it may often happen, that the owner of theſe may have more profit by feeding

feeding them, even under this disadvantage, than by keeping them till they attain their full maturity. It, therefore, becomes a question in rural œconomics, in what cases the one or the other of these modes of feeding ought to be adopted; which could be the easier solved, did we know exactly what was the proportional difference of the expence of feeding different classes of animals in each of these cases.

With regard to the last part of the query —It is sufficiently well known, that young mutton is never so agreeable to the palate as such as hath attained to full maturity;— but how long it continues to improve, does not seem as yet to have been so fully ascertained as it ought to be.—There does not seem to be near such a difference between young and old beef or pork; and, therefore, the farmer is, or ought to be, under less restraint with regard to these.

XXXII.

XXXII.

Do different claſſes of animals require an equal quantity of food in proportion to their ſize? If there is any difference in this reſpect—What is the exact amount thereof with reſpect to each particular ſpecies of domeſtic animals when compared with others?



It is certain, that if we compare very different orders of animals with one another, we will diſcover a prodigious difference in this reſpect.—A caterpillar will conſume in a day more than double its own weight of food, while the chameleon would be ſuſtained for months upon a like proportion of food;—the camel is likewiſe believed to require a much ſmaller quantity of food in proportion

proportion to its ſize than almoſt any other quadruped.

But, to come to thoſe in which we are more nearly intereſted—It is univerſally believed, that an horſe requires a greater quantity of food to ſuſtain it than an ox of the ſame weight: But I have never yet heard of any experiment that has accurately determined what is the exact proportion in this reſpect.—Common opinion ſeems to place it at different proportions; ſometimes rating the horſe at double the ox, and ſometimes at only one third more. For, in many parts of the country, the price of the ſummer-food of an ox is preciſely one half of that of the horſe; but, in other places, the difference is only as four to ſix.—Whether either of theſe is exact, or which of them is neareſt the truth, deſerves to be aſcertained with preciſion. But, as the opinion is ſo univerſally prevalent, that the horſe requires a greater quantity of food in proportion to

its ſize than the ox, the probability is, that it really does ſo.

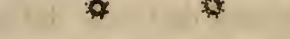
As the other kinds of domeſtic animals differ more in ſize from one another than theſe do, it is not ſo eaſy to make a compariſon between them;—but, as it is poſſible they may vary conſiderably from one another in this reſpect, the farmer muſt remain very much in the dark with regard to a very eſſential branch of his buſineſs, till this be determined with preciſion.

XXXIII.

We obſerve, that there are a great many varieties of each particular ſpecies of animals, that are diſtinguiſhed from others of the ſame ſpecies by certain peculiarities that are on many occaſions eaſily preceptible. Theſe varieties among the brute animals have been uſually diſtinguiſhed among farmers

mers by the appellation of different *breeds*; as they have ſuppoſed that their diſtinguiſhable qualities are, at leaſt, in a certain degree, tranſmiſſible to their deſcendants; although naturaliſts, overlooking theſe diſtinctions, conſider each of theſe as only an accidental variety of the individual, which hath little or no influence upon their progeny. Query, therefore,—Whether theſe different *breeds*, as they are called, of any one claſs of domeſtic animals, is really a diſtinct tribe, endowed with the power of tranſmitting to its poſterity all its diſtinguiſhing properties, ſo long as it is prevented from intermixing, by copulation, with other breeds; or are the varieties that we perceive, in this reſpect, to be attributed to accidental cauſes alone, and not immediately depending upon the nature of the parent animal?

We



We would imagine, that, in a caſe of ſo much importance as this we now treat of, with regard to which mankind have had ſo many opportunities of trying experiments, and making particular obſervations, there could have remained no room to doubt long before this time. But, although ſcience, in general, tends to improve knowledge, on ſome occaſions, it rather confounds and perplexes the underſtanding. For, when we find that the ſyſtems we have invented are incapable of explaining all the phænomena that occur, we are but too ready to deſpiſe, with a faſtidious pride of mind, thoſe phænomena that would perplex our ſyſtem, and haſtily to ſay, they owe their exiſtence to inaccurate obſervations alone.

This ſeems, in a particular manner, to have been the caſe in the preſent inſtance.

And,

And, although it is impoſſible for any reaſoning to get the better of daily experience, ſo far as to make a man believe directly the reverſe of what he ſees with his own eyes; ſo as that nothing can convince the farmer that the nature of the animal from which he breeds will not have ſome influence upon its progeny;—yet it has ſo far prevailed, as to induce almoſt every farmer to believe, that, unleſs in the particular caſes that have occurred to himſelf, all the other varieties obſervable in the breeds of animals, are either entirely occaſioned, or much influenced by peculiarities of ſoil, food, or climate. So that in no inſtance do we meet with ſuch an unaccountable diſcordance, between general opinion and particular practice, as in this very caſe.

That all the qualities which ſerve to diſtinguiſh particular breeds of animals from one another can, in ſome caſes, be tranſmitted without alteration to their poſterity for ever,

ever, if they are always kept from copulating with other breeds of the ſame kind, ſeems to be fully demonſtrated by what we obſerve with regard to dogs; the different varieties of which are endowed with ſuch remarkable peculiarities, as ſerve to point out the particular breed with ſo much certainty and facility, as makes it impoſſible for any one not to perceive at once if the breed has been debaſed: And our experience with regard to them is ſo univerſal, as to leave no room for the moſt ignorant to doubt, that all the varieties of theſe that we meet with, inherit, from their parents, the peculiar diſtinguiſhing natural talents that they poſſeſs; and that theſe are in no caſe to be attributed to any diverſity of food, or any other circumſtance whatever.

The ſame thing is alſo, in a great meaſure, remarked with regard to the horſe;—although the different varieties of this animal are not ſo diſtinctly marked as thoſe of the

the dog-tribe; and, therefore, the proofs of the fact in diſpute are not ſo palpably evident as in the other caſe. Yet we would ſurely laugh at the abſurdity of that man, who ſhould hope to rear a large-boned weighty dray-horſe by breeding from a fine Arabian mare and ſtallion; or who would expect to have a light-running horſe from a father and mother of the dray-breed; let him feed them in whatever manner he may incline. And, although the different breeds of horſes are almoſt infinite, and few of them ſo much different from each other as in the above example, yet it is obſervable, that the prevailing breed in any one diſtrict always continues of the ſame kind, ſo long as the inhabitants of that diſtrict continue to breed from them, whatever alterations they may make in the general culture of the country, and nature of the paſtures. Nor do theſe horſes ever alter their qualities, if they are carried to another diſtrict, where another

another breed of very oppoſite qualities, in general prevails; but each retains its diſtinguiſhing qualities to the laſt, although they ſhould continue to eat the ſame food, and be treated in every reſpect alike to the lateſt hour of their lives.

Nor is the caſe in the leaſt different with regard to cattle, ſheep, and hogs,—and perhaps all other animals. For, let a hundred different breeds of either of theſe kinds of animals be brought from as many different places, and fed upon one common paſture as long as you incline, each of theſe will continue to preſerve every mark of diſtinction from all the others ſo long as it lives.—But, if theſe are allowed to breed promiſcuouſly, the progeny would neceſſarily be a mongrel breed, participating of the nature of each of the parents who ſhould have contributed to produce them.

Many other arguments might be adduced to ſhow, that we have the greateſt reaſon to believe,

believe, that each particular breed of other animals propagates its own kind with as little variation as is acknowledged to be the caſe with dogs, ſo long as they remain unmixed with others. But theſe, to avoid prolixity, I omit.—I could not, however, avoid throwing out theſe obſervations on a ſubject of ſo much importance; as the erroneous opinions that have ſo long prevailed with regard to it have been, in ſome caſes, attended with conſequences highly detrimental to the community.—If theſe hints ſhall induce others to examine the ſubject with attention, I ſhall be perfectly ſatisfied.

XXXIV.

If different *breeds* of domeſtic animals do, on many occaſions, poſſeſs particular qualities, that differ very eſſentially from thoſe poſſeſſed by other breeds of the ſame claſs of

animals; and if theſe qualities are tranſmiſſible to their poſterity without alteration, ſo long as the breed remains unadulterated by an admixture with others, it will be a matter of the utmoſt conſequence to the farmer, to be well acquainted with the nature and diſtinguiſhing qualities of every particular breed of all thoſe animals that he may have it in his power to rear; that he may thus be enabled to chooſe only that particular breed which poſſeſſes, in the higheſt degree, thoſe qualities of which he means chiefly to avail himſelf.—Wanted, therefore, An exact liſt of all the various breeds of domeſtic animals, with a particular ſpecification of all thoſe qualities for which each breed is peculiarly remarkable?

There ſeems to be great reaſon to believe, that the ſeveral breeds of domeſtic animals differ

differ more from one another with reſpect to ſome of thoſe qualities that may make them more or leſs valuable to the farmer than is in general apprehended at preſent. The gentlemen of the *turf* and *menage* talk with the utmoſt confidence of different degrees of vigour, perſevering ſtrength, hardineſs, and even mental qualifications, if I may uſe that expreſſion, of the different breeds of horſes. Thoſe of Spain are much praiſed, as well for their external beauty as for their judgment and memory. The Barbe is deemed naturally more indolent; although he is capable of as high exertions either of body or mind, when obliged to it, as almoſt any other: Being in an eſpecial manner, capable of continuing in any violent exertion much longer than moſt other horſes; although the Arabian courſer is by ſome thought to poſſeſs theſe ſame qualities in a ſtill higher degree.—All of theſe require to be nouriſhed with care, and treated with the utmoſt circumſpection.

On

On the contrary, the horſes of Denmark and Frieſland are ſaid to be ſtronger and more hardy,—live upon any fare, and are hurt by no ſort of bad treatment.—The Neapolitan horſes are large and ſhowy; but are incapable of any violent exertion, and are ſoon exhauſted, if they are much put to it.—The ſame qualities are remarked in many of the large-boned ſhowy horſes in England; on which account, thoſe only are by the connoiſſeurs deemed capable of undergoing the violent fatigue of hunting, racing, &c. which have, in the jocky-ſtyle, at leaſt *ſome blood* in their veins. By which is underſtood, that they are deſcended, either by the father or mother, from an Arabian, Perſian, Turkiſh, Spaniſh, or Barbary horſe or mare: All of which are ſuppoſed, in an eminent degree, to poſſeſs great muſcular ſtrength and length of wind.

But, beſides theſe more remarkable diſtinctions, there are many other varieties of this uſeful

uſeful animal reared in different parts of this iſland, and only employed for draught and other uſeful ſervices, that are well known to differ from one another as much in their degree of hardineſs or *mettle*, as it is ſometimes called, as in their external form and appearance —Some of theſe are of ſuch enormous bulk and ſtrength, as to drag ſlowly after them the load of an elephant, but are utterly incapable of any violent quickneſs of motion.—Others are naturally endowed with greater agility and leſs bodily ſtrength as to carrying burdens; but are poſſeſſed of great hardineſs, ſo as to be capable of enduring fatigue for a long time, without being hurt by it.—Some attain their full degree of ſtrength and bodily vigour at a very early period of life; while others continue long extremely weak, and incapable of great exertions; but, after they arrive at ſix or eight years of age, become hardy and capable of exerting their ſtrength for a very long time without being hurt.

hurt.—Some are naturally cool and perſevering, while others are more fiery and fretful, and can never be brought to yield that ſteady exertion of ſtrength that the others naturally do.—In ſhort, the varieties in this reſpect are ſo many and great, that it would require a very extenſive experience to be able to point them out with any degree of preciſion.—But, were it once done, it would be of the utmoſt utility to the farmer; as he would then know exactly what breed would beſt anſwer the particular purpoſe that he on any occaſion might wiſh to accompliſh.

It would perhaps be of ſtill greater utility to the farmer to have all the peculiar and diſtinguiſhing qualities of each of the different breeds of cattle pointed out with preciſion; which probably do not differ leſs from one another than horſes do.

Many attempts have of late been made by improving farmers in different parts of Britain to better the breed of their cattle. But,

as the particular breeds of cattle that have on theſe occaſions been tranſported from one part of the country to another, have been uſually ſelected on account of qualities that they were only *ſuppoſed* to poſſeſs, rather than in conſequence of any full inveſtigation of the ſubject by which their real good or bad qualities have been pointed out with accuracy; it may be much doubted, if theſe attempts have been in many caſes attended with any beneficial conſequences at all. For, ſo long as we are guided in this caſe by any other rule than that certainty that reſults from accurate experiments, it may be naturally ſuppoſed, that the mind of the ſanguine improver will be apt to magnify every excellent quality that he may think he perceives in his favourite breed; while it as naturally diminiſhes the good qualities of ſuch as may be out of favour at the time.

Thus, at one time, the large Dutch breed of cows were much in vogue, and were much

much more valued than any other kind.—But, in a few years, it was diſcovered, that they did not poſſeſs all the qualities for which they were at firſt cried up; and they gradually fell into diſeſteem.—Theſe were ſucceeded by the Yorkſhire,—which in their turn were ſucceeded by the Lancaſhire breed; which is at preſent more eſteemed than any other ſort, and will probably continue to be ſo for a few years; when they in their turn will be neglected, and give place to ſome other favourite breed which accident may recommend to public favour.

In this manner it may be expected that things will go on, till mankind ſhall become ſo ſober-minded, as to be firmly perſuaded that perhaps no one breed of cattle is poſſeſſed of all the different qualities that could be deſired on different occaſions; and, therefore, ſet themſelves ſeriouſly to diſtinguiſh from one another the different qualities that may render this animal, on any particular occaſion,

occaſion, more or leſs valuable, and then endeavour to diſcover which particular breed poſſeſſes that one quality in the higheſt degree.—Thus, one man perhaps requires above all other qualities, that his cattle be poſſeſſed of great bodily ſtrength, and a power of exerting the nerves and muſcles for a great length of time without being fatigued.—Another perhaps diſregards this quality, and only wiſhes for an ox that will admit of being fattened quickly, and carry a great weight of beef.—A third, perhaps, requires that that weight ſhould be chiefly in ſome particular part of the body.—A fourth values only the quantity of the milk.—A fifth is chiefly anxious about its quality;—while a ſixth is, perhaps, more anxious to obtain the beef of a peculiarly fine quality than any of theſe;—or values his cattle for ſome other quality, different from any of theſe above enumerated.

But, were we to know with certainty which particular breed poſſeſſed, in the higheſt degree, that peculiar quality that we moſt wiſhed for, and the other peculiarities that it poſſeſſed along with this, we would be enabled to pick out with preciſion that particular breed that beſt ſuited our particular purpoſe, or the circumſtances that we were in at the time; leaving others to make choice of ſome other breed that might be ſtill more profitable to them.

Hitherto we have been ſo little accuſtomed to conſider this ſubject in this point of view, that it would be in vain to look for facts that could be relied upon with regard to it, from the writings or converſation of ſuch improvers as have endeavoured to introduce any particular breed into any diſtrict. For theſe kinds of cattle are ſo much praiſed for every excellence when they are in vogue, and ſo indiſcriminately decried after that period, that it is next to impoſſible to diſtinguiſh

guiſh the qualities for which they are truly eſtimable from thoſe for which they are by no means remarkable.—It ſeems, however, to be pretty certain, that the large Dutch breed of cows do uſually yield a very large quantity of milk, although it is but of an inferior quality; while, on the contrary, the ſmall delicate Alderny breed of cows are as remarkable for the richneſs of the milk, and the delicacy of the butter that it affords.—And, although the Lancaſhire breed is juſt now in favour, and thought, in general, to poſſeſs almoſt every quality in the higheſt degree, yet the ingenious Mr Young has ventured to aſſert, that cows of this breed do not yield near ſo much milk in proportion to their ſize as the Suffolk cows.

As to other qualities, there is ſo much room for the imagination to magniſy or diminiſh them as prejudice may ſuggeſt, that we can hope for nothing deciſive with regard to them without fair and accurate comparative

parative trials, made under the direction of ſome man of probity and diſcretion.

But, if it would be of ſome uſe to the farmer to know with accuracy the diſtinguiſhing characteriſtics of each particular breed of cattle, it would be of ſtill greater conſequence for him to know with certainty all the varieties that take place with regard to ſheep; which, perhaps, admit of a much greater diverſity; and, on account of the value of the fleece, it is probable, that it would be of much greater national conſequence to have theſe accurately pointed out. —As no attempt hath as yet been made to aſcertain, with any degree of preciſion, the diſtinguiſhing qualities of each of the different varieties of this ſpecies of animals, it is in vain to hope for any thing like certainty on this head for ſome time to come.—The following hints, however, intended to ſerve as a ſlight beginning for ſuch an inveſtigation, it is hoped, will be received with indulgence

dulgence by the public, on account of the great importance of the ſubject.

Many of the peculiarities by which different breeds of ſheep are diſtinguiſhed from one another are obvious to the ſenſes; and, therefore, afford an eaſy criterion for diſtinguiſhing them from one another: Although it is alſo probable, that they may, on ſome occaſions, differ from one another in leſs obvious, although not leſs eſſential reſpects. —The following are a few of the moſt remarkable peculiarities, in reſpect of which different breeds of ſheep vary from one another.

1*ſt*, A very great variation is perceptible in different breeds of ſheep with regard to *ſhape*.—The Dorſetſhire ſheep are tall and light of body, much reſembling the camel in ſhape and proportions;—and the breed that is moſt eſteemed and recommended by Mr Bakewell of Leiceſterſhire are large bodied and ſhort-legged, more reſembling the figure

figure of the beaver.—The other varieties of ſhape and proportions are almoſt infinite. And the ſame may be ſaid of all the peculiarities under mentioned.

2*dly*, Some breeds of ſheep have horns, and others have none at all.—In Lincolnſhire a horned ſheep is a rarity;—and, on the contrary, in Dorſetſhire, and ſome parts of Wales, a ſmooth-headed ſheep would be looked upon as a ſort of wonder.—In ſome other places, four, ſix, or even eight horns, are not uncommon.—The horns of ſheep are uſually twiſted;—but ſome breeds have long horns, bending a little backward, but not twiſted, like thoſe of the goat.

3*dly*, Different breeds may be ſometimes diſtinguiſhed from one another by the colour of their faces.—In Lincolnſhire all the ſheep have white faces; and in Norfolk they are as univerſally black.

4*th*, Different breeds vary from one another in reſpect of the length or ſhortneſs of the

the wool.—The fine combing wool of Lincolnſhire, Romney-marſh, &c. ſometimes meaſures half a yard in length;—the wool of Spain exceeds not two inches; and that of Dorſetſhire, Cotſwold, and Leominſter, is little longer.

5th, They likewiſe vary from one another with regard to the manner in which the wool grows upon the ſheep.—Sometimes the whole body is uniformly covered with a coat of wool, the hairs of which are ſlightly interwoven with one another, as if they had been frizled by art;—as in the Dorſetſhire, and, in ſome meaſure, the Lincolnſhire ſheep.—Sometimes it divides into ſeparate locks, which, on ſome occaſions, hang down long and lank, in ſome meaſure like combed hair;—as is the caſe with a breed of ſheep common in the ſouth of Scotland. And ſometimes theſe meſhes are done up into ſeparate ſmall cloſe curls, like a wig

of

of baken hair;—as is peculiarly remarkable in a breed of ſheep in Sologne, (a diſtrict in France), inſomuch that it has there become a common proverb, that the wool of Sologne has been curled by the bill of the larks *, the meſhes are ſo ſmall, and the curls ſo exceedingly cloſe.

6th, They alſo differ from one another in reſpect of the fineneſs of the pile of the wool.—The wool of Perſia, Segovia, Leominſter, and ſeveral other parts of Britain, are well known to be as remarkable for their uncommon degree of fineneſs, as that of Cornwall—and of Norway, is for the exceeding coarſeneſs thereof; theſe being ſaid to approach nearer to the nature of hair than wool †.

7th,

* *La vrai laine de Sologne eſt celle qu'a été friſée par les alouettes.*

† It has been already remarked, that the climate has ſome effect upon the quality of the wool of ſheep, the fineſt wool being moſt naturally produced in

7th, They likewiſe differ from one another in colour.---In Europe, white ſheep are

in the coldeſt regions; from whence ſome may be diſpoſed too haſtily to conclude, that the ſeveral variations we meet with in this reſpect, ought to be attributed to that cauſe alone. But that diſtinct breeds of ſheep differ very much from one another in this reſpect, independent of the influence of climate, is ſufficiently obvious from this circumſtance, that we find in different diſtricts of the ſame country, which enjoy an equal temperature of climate, wool of very unequal degrees of fineneſs; and frequently we meet with ſheep, in cold countries, that carry wool of a much coarſer quality than what is found in regions conſiderably warmer than they are. Hence, therefore, we ought to conclude, that although warmth of climate invariably tends to make the wool that grows upon any ſheep coarſer than it would have been upon the ſame ſheep, if it had been in a colder climate, yet that this has no influence on altering the nature of its progeny, nor even of producing any change upon the animal itſelf, longer than it is immediately under the influence of that heat. A ſheep that has been carried to the Weſt Indies, and there

loſt

moſt common; and next to theſe black are moſt frequently ſeen.—In Perſia, they have wool

loſt its wool, when it returns to Europe again, affords a fleece of as fine wool as before it went out to that warm region: And, in temperate climates, the points of the wool, that is to ſay, that part of the fleece that ſprings out from the ſheep's body during the warm weather in ſummer, is always much coarſer than that part which grows during the cold weather in winter; the difference between the top or bottom of the fleece being always in proportion to the difference between the heat and cold that the ſheep has experienced at theſe different ſeaſons, and conſequently is ſmaller where ſheep perambulate, as in Perſia and Spain, than in countries where they never change place at all: And, in this laſt caſe, it is always greater in northern continental countries than in iſlands, as has been already remarked. A variation with regard to the climate, therefore, produces only a temporary change upon the fineneſs of the wool of that individual ſheep that is immediately expoſed to its influence; but the difference in this reſpect that ariſes from a variation of the breed of ſheep, is of a more permanent and invariable nature;

wool of three colours; white, reddiſh, and ſilver-grey.—In the province of Andaluſia in

ture; as any two ſheep, originally of different breeds, not only retain the ſame difference between one another, if they are, at the ſame time, carried through any diverſity of climates, but their deſcendants alſo retain, at all times, if in equal circumſtances, the ſame difference that was obſerved to take place at firſt. Hence, therefore, it may happen, that a particular breed of ſheep may carry, at all times, coarſer wool in a cold climate than another breed that always lives in a warmer region; the influence of the climate not being ſo great as to counter-act the ſuperior influence that is derived from the parent ſtock.

It is of much conſequence that the reader ſhould accurately diſtinguiſh between theſe two different circumſtances that influence the quality of the wool of ſheep; becauſe, if this is not done, he will be embarraſſed and perplexed by ſeeming contradictions, that it will be impoſſible for him to explain; ſo that he will be apt to remain irreſolute and undetermined in his conduct. For if, without this knowledge, he ſhould have attempted to improve his wool by bringing ſome

in Spain, there is a race of ſheep that are brindled, and ſpotted black and white;—and,

ſome fine ſheep from a colder region to his own, and ſhould afterwards find, that, inſtead of very fine wool, that they yielded in their native country, they produced to him no finer wool than his own ſheep formerly afforded him, he would be apt to imagine that the nature of his climate over-ruled every other circumſtance, ſo much as to bring the fleece of every different kind of ſheep into one quality, which he would look upon as the ſtandard of his climate or ſituation; and, therefore, might think, that it would be in vain for him to attempt improving it.—And if, at the ſame time, he ſhould have chanced to bring, from a warmer climate, another breed, that in their native country yielded wool of a coarſer quality than his own, and ſhould afterwards find, that the wool produced from theſe ſheep was of the ſame fineneſs with that of his own ſheep, he would be ſtill farther confirmed in his opinion of the over-ruling influence of his climate, and reſt ſatisfied, that, as he could not hope to improve the quality of his wool, ſo he need not fear that it could ever

and, in the Iſle of Man, there is ſaid to be another breed that carries wool of a light buff-colour.

8th,

ever be debaſed; and that, of courſe, he needs give himſelf no ſort of trouble upon that head.

But if the foregoing caſe were juſt reverſed:—Had the farmer firſt chanced to take a fancy for ſome fine woolled ſheep that were natives of a warmer region, and tranſported ſome of them to his own country, where he found the wool become much finer than it formerly was: And ſhould he afterwards, in his travels, meet with another breed in a colder country that produced ſtill finer wool than the other afforded, and, hoping that a ſimilar change would reſult from a change of place in this caſe as in the former, ſhould get ſome of theſe alſo tranſported to his own country,—How great would his amazement be when he afterwards found that theſe ſheep, inſtead of being improved by that change as formerly, had degenerated ſo far as to produce wool of a coarſer quality than either of the former! Without having known or attended to the foregoing diſtinction, this phænomenon would have appeared inexplicable. But it would not have been attended

with

8*th*, They likewiſe differ from one another with reſpect to the purity of their wool. —Some breeds have their fleece perfectly free of any mixture whatever, while others have a greater or ſmaller proportion of a particular kind of hair intermixed therewith, that is known in ſome parts of England by the name of *Stichel* hair; and in the northern counties by that of *Kemps*; and in France

with ſuch fatal conſequences as the liſtleſs indolence occaſioned by the ſeemingly natural concluſion that was drawn from the former experiment.

Before I conclude this note, it may be proper to remark, that, although the change produced upon the quality of the wool by a *great* variation of climate is very conſiderable, yet a *ſmall* variation in that reſpect produces no ſenſible change; ſo that the farmer may, in general, diſregard this circumſtance in the changes, that he may think it proper to make by tranſporting the ſheep of one diſtrict of the ſame country into another diſtrict.—The variation of the breed in this caſe being almoſt the only circumſtance worth attending to.

France by the appellation of *Jarre*.---This is a kind of ſhort opaque white-like hair, that grows up among the fleeces of ſome kinds of ſheep, that may be eaſily diſtinguiſhed from wool by its dead-like colour, and by being always thicker at the roots than towards the points, (which is the reverſe with wool) and by having no degree of elaſticity.—As no wool that has any mixture of this can be properly dyed, or wrought into any valuable manufacture, it ought to be guarded againſt with the moſt ſcrupulous attention.

9*th*, Different races of ſheep likewiſe vary very much from one another in reſpect of ſize.—In Shetland there is a breed of ſheep ſo ſmall, that, when full grown and fat, will not weigh above three or four pounds per quarter;—and another nearly as ſmall as this is kept as a curioſity in ſome parts of Normandy in France. Whereas in Flanders, and ſome parts of England, it is not uncommon

uncommon for a quarter of mutton to weigh forty or fifty pounds *.

10*th*,

* We have ſeen, that, although different breeds of ſheep vary from one another very much with regard to the fineneſs of their wool, and that this difference between them, ſo long as they remain in equal circumſtances, is permanent and invariable, yet that a variation of the heat of the climate does produce a ſenſible effect upon the quality of the wool of every kind of ſheep; and, in like manner, although there can be no doubt but that there are different breeds of ſheep and other animals differing eſſentially from one another with regard to ſize, yet it is equally certain, that ſome variation may be produced in this reſpect by the nature—abundance, or deficiency of their food. Thus, ſuppoſing that all the different breeds of ſheep were fed upon paſture where they had at all times as much good food as they were able to deſtroy, and were treated properly in other reſpects, there ſeems to be little doubt but that ſome of theſe would be of a much larger ſize than others; whoſe deſcendants, in theſe circumſtances, would continue to retain the ſame difference for ever, if they were never ſuffered to copulate

10*th*, They alſo differ from one another by the length of their tails.—In Scotland,

pulate with one another: Yet, if any of theſe are carried to another place, where they find a more ſcanty ſubſiſtence, their progeny will gradually diminiſh in ſize, ſo as never to reach the ſtature of their original progenitors ſo long as they remain in that half-ſtarved condition. But if, at ſome diſtant period, ſome individuals of this unnaturally ſmall breed of animals ſhould chance to be carried to another diſtrict, where they ſhould have more abundant food and warmth when young, their progeny would gradually out-grow their parents, till at length they ſhould attain the full ſize of the original parents of their race; after which they would remain ſtationary ſo long as they ſhould enjoy this abundance of food and other requiſites. It is from this cauſe that animals in Alpine countries, in which their young are uſually ſtinted in their growth for want of abundant nouriſhment and genial warmth, are almoſt always ſmaller than in low and fertile countries, where they more uſually attain their natural ſize. Thoſe, therefore, who alledge that it is in vain to hope to alter the ſize of the animals

the tail of the common breed of ſheep does not reach lower than the knees; the tails of Engliſh ſheep uſually reach the heels in their natural ſtate.—I take no notice here of the broad-tailed African ſheep, as it is not a native of this part of the world.

The variations that take place with regard to the above mentioned particulars are ſo eaſily diſtinguiſhable, that the moſt inattentive obſerver cannot fail to have remarked

mals bred in any country, becauſe the paſtures, &c. in each place will either raiſe or diminiſh theſe till the animals attain the ſize that it is naturally fitted to produce, have ſome reaſon for what they alledge, although it is not ſtrictly true. Want of abundant food, or an unnatural degree of cold, will always retard the growth of a young animal, and make it ſtop before it hath attained its natural ſize; ſo that a large breed may thus become, in certain circumſtances, no bigger than one that was naturally of a much ſmaller ſize. But no treatment could ever bring a breed naturally ſmall to equal the ſize of one that was originally large, if it is reared where it can have food and warmth in abundance.

marked them on many occaſions. Theſe that follow are not perhaps leſs certain and permanent, although they do not ſo ſenſibly attract the attention.

11*th*, Certain parts of the fleece of every ſheep are finer than other parts of the ſame fleece; but the difference in this reſpect in different races of ſheep is very great.—Sometimes the wool about the neck and ſhoulders will be remarkably fine and ſilky, and that on the buttocks of the ſame ſheep be exceeding hard and coarſe; and, on the other hand, ſome kinds of ſheep afford a fleece in which the difference in this reſpect is far leſs conſiderable.

12*th*, In the ſame manner, as we obſerve that ſome individuals of the human ſpecies have the hair of their heads much thicker and cloſer than others, ſo it may be obſerved with regard to different breeds of ſheep, that ſome of them yield a much thicker and more weighty fleece in propor-

tion

tion to the bulk of the animal than others do. It would, therefore, be of great uſe to the farmer to be able to know with accuracy the exact difference in this reſpect between any two varieties of this ſpecies of animal that he might have it in his power to rear.

13*th*, Some kinds of ſheep give a much greater quantity of milk in proportion to their ſize than others do; and, therefore, make much better and fatter lambs than theſe, upon paſtures equally good.—This is a diſtinction ſeldom attended to, although it might be on many occaſions of the utmoſt conſequence to the farmer.

14*th*, It it well known that certain breeds of ſheep are more diſpoſed to produce twins than others.—There is in Holland a large breed of ſheep that ſeldom have leſs than two, often three, and ſometimes four lambs at a time—In Lincolnſhire, and ſome other parts of England, the ewes almoſt univerſally

ly produce two lambs; and in other parts, where the ſheep are equally well fed, this is a ſort of rarity.

15*th*, It is likewiſe in general believed, that ſome particular kinds of ſheep are more eaſily diſpoſed to carry lambs twice a-year, or bring them at different times of the year, than others are.—The Dorſetſhire ſheep have been ſaid to poſſeſs that quality in a peculiar degree;—and, although this could ſeldom be of much utility, yet, as it might, on ſome occaſions, be of uſe, it would be an advantage to the farmer to know all theſe *.

16*th*, It

* It is commonly ſaid that, in Egypt, ſheep yean twice a year. Poſſibly, in that warm climate, this may not be ſuch an exaggeration as the ſame hyperbolical expreſſion is, when applied to more northern climates; although ſome modern travellers have denied that this is the caſe, even in Egypt. An ewe goes with lamb five months; ſo that, ſuppoſing ſhe either did not ſuckle her lamb, or that ſhe again took the

16*th*, It is alſo in general believed, and probably with good reaſon, that ſome particular breeds of ſheep are naturally more hardy, and leſs ſubject to diſeaſes or accidents of any ſort, than others; although the farmer has not yet the ſatisfaction of knowing experimentally if this be really the caſe or not.—Or, if it is,—What are the particular breeds that are eminently diſtinguiſhable for this valuable property?

17*th*, It

the ram while giving ſuck, within one month after yeaning, (which is a thing that I believe rarely, if ever happens, with regard to this ſpecies of animals,) it would be barely poſſible that they ſhould regularly produce lambs twice a-year. But, as this is a thing that cannot be expected to turn out to any valuable account, in a climate like that of Britain, we may look upon it rather as a matter of curioſity than otherwiſe. As to their bringing a lamb, perhaps very early in one ſeaſon, and another ſo late, as that both are brought forth within the courſe of one year, I conſider it as an abuſe of language to call that having lambs twice a year; and, therefore, as deſerving no farther notice.

17*th*, It does not ſeem in the leaſt contrary to reaſon to believe, that there may be ſome particular breeds of ſheep and other domeſtic animals, that may perhaps by nature require leſs food to ſuſtain them, than others of their own ſpecies of an equal ſize with themſelves may require. Yet I know of no experiment that has been made with a view to determine this important queſtion, from which we could draw any uſeful concluſion.—But, as it is of much importance to have this fact aſcertained with preciſion, it ſurely merits the ſpecial attention of thoſe who may have it in their power to proſecute experiments of this ſort.—The reaſons that induce me to think that this might probably be the caſe, are as follow.

We have already ſeen, p. 136. that ſome animals of one genus require a greater quantity of food than thoſe of another genus, although of an equal ſize: From which we may be led at leaſt to enquire, if this may not

not on ſome occaſions happen to be the caſe with regard to different varieties of the ſame ſpecies.—Some horſes will thrive upon harder fare than others; and ſome kinds of cows are more eaſily kept up in winter than others; which would ſeem in ſome meaſure to corroborate this conjecture.

And, that ſomething of this kind does actually take place with regard to the different varieties of dogs, ſeems to be in general allowed;—as I never heard it diſputed by thoſe who had attended to this circumſtance, as to this claſs of animals, that that particular breed of dogs called pointers, require a much larger proportion of food to keep them properly than grey-hounds do; and that maſtiffs take ſtill leſs food, in proportion to their ſize, than grey-hounds *.—I would be far, how-

* This obſervation ſeems to be confirmed by the experiments of Mr Arthur Young, who finds that ſome kinds of cattle require one third of their weight per day to feed them, and others only one fifth. Exp. Agr. Vol. II. article Cattle.

however, from aſſerting theſe as undoubted facts;—but popular opinions have for the moſt part ſome foundation in truth; and, therefore, deſerve to be confuted by experience, or undiſputable arguments, before they are fairly rejected.

If this difficulty were ſolved, it would enable us to deviſe proper experiments for determining another that has been often propoſed and debated with much warmth, altho' it can admit of no final ſolution till this previous doubt be diſcuſſed, viz. Whether it is moſt profitable for the farmer to rear animals of a large breed, or ſuch as are ſmaller: That is to ſay, Whether a large breed of ſheep or cattle require food of a better quality, or in greater quantity, in proportion to their ſize, than ſuch as are ſmaller: Or, in other words, Whether the ſame field of graſs would rear a greater weight of beef or mutton, if it were depaſtured with a breed of large, or another of ſmall cattle or ſheep.

A large animal is ſo beautiful to look at, and conveys ſuch an idea of plenty and luxuriance to the imagination, as is apt to catch the fancy, and impoſe upon the judgment ſo much, as not to allow us to attend to all the circumſtances that might produce ſome effect, with that cautious circumſpection that is neceſſary in oeconomical diſquiſitions of this ſort. Hence, it has uſually happened, that thoſe improving farmers who have endeavoured to better the breed of theſe two uſeful kinds of animals in any one diſtrict, have attempted to do it, by introducing a larger inſtead of a ſmaller kind: Which circumſtance alone they have always conſidered as a capital improvement.—But, it has as generally happened, that the bulk of the inhabitants in every country, imagining that large animals of any ſort require a greater quantity of food, in proportion to their bulk, than ſmaller ones, as well as a more careful management, have always looked upon theſe

attempts

attempts to introduce a larger breed among them, rather as hurtful than beneficial; and have, therefore, oppoſed ſuch innovations with all their might.—Now, if it ſhould be found, upon a proper examination, that ſome varieties, either of the ox or ſheep, require a greater or ſmaller proportion of food than ſome other varieties of theſe do; it would be poſſible that each of theſe two oppoſite opinions might, in different circumſtances, be juſt. For, it might ſo happen that, of two varieties that ſhould be compared with one another in one corner, the ſmalleſt might be the moſt hardy breed, and that which required leaſt food in proportion to its ſize,—while, in another diſtrict, where the ſame experiment ſhould chance to be tried, the largeſt of the two might poſſeſs theſe valuable qualities in a more eminent degree. So that, till the firſt difficulty is finally determined, we can draw no general concluſion from

any

any particular experiments that might be made with a view to elucidate the ſecond.

The above catalogue comprehends almoſt all the particulars that occur to me as contributing to occaſion any variation between the different races or breeds of ſheep.—And, if it be conſidered that not only each of the oppoſite qualities above enumerated, may be poſſeſſed by different breeds in all the intermediate ſtages between the one extreme and the other; but alſo, that any one or more of the other peculiarities may be blended with theſe in all poſſible proportions, we will eaſily perceive that the varieties produced by this means may be almoſt infinite;—ſo that it is perhaps impoſſible to form any adequate idea of the improvements that might be made in this particular branch of rural oeconomics, ſhould the general attention be properly directed towards it, and the judicious efforts of individuals be long enough continued.—But, as many opinions prevail

on

on this ſubject that ſeem to have been derived from the limited obſervations of private individuals, who have not had an opportunity of being better informed, that very much tend to diſcourage the attempts that might be made towards improvement in this reſpect; it may not perhaps be improper, before we leave this head, to examine, with ſome degree of attention, a few of theſe opinions that may firſt occur.

It ſeems to be an opinion rather too univerſally prevalent, that that breed of animals which is found in any one diſtrict, is more peculiarly adapted to the nature of the climate and other circumſtances relating thereto, than any other that could be introduced into it; and that, of conſequence, any attempts that may be made towards any improvement in this reſpect, will not be attended with the expected ſucceſs.—But, although it ſhould be allowed, that the beneficent Creator of this univerſe, hath in general provided every

ry country with these productions, whether of the animal or vegetable kingdom, that are most essentially necessary to the existence of the inhabitants thereof; yet, as daily experience proves, beyond a possibility of doubt, that peculiar animals, as well as vegetables, are sometimes found in one country, and not in another, which is exactly similar to it in every respect, in which these animals or vegetables do thrive when transplanted to it, as well as in their native country; it would seem that this partial deficiency had been wisely so ordained to serve as a spur to human ingenuity and industry,—as a most powerful mean of promoting that social intercourse between different nations, which hath such a direct tendency to correct local prejudices, and humanize the soul, rather than to repress those vigorous exertions of the mental powers in which the principal happiness of man so evidently consists.—And the success that has attended many at-

tempts

atempts of this kind, and the benefits that reſult from thence to ſociety in general, ſufficiently confirm the obſervation.—The ſilk-worm was long confined to a particular diſtrict of Aſia alone, although it has been reared for hundreds of years paſt to as great perfection in many parts of Europe, as in its original native country.—Pears, cherries, peaches, apricots, and all the other fine fruits of our gardens, are natives of other diſtant countries, and were utterly unknown, not only to our anceſtors in Britain, but to all European nations:—Even cabbages, coleworts, and colliflowers, with almoſt all the numerous train of garden-roots and pot-herbs, were only of late introduced into Britain; where they are now reared in greater perfection than on any other part of the globe.—Horſes, cows, and ſheep, were not known in America before the Europeans ſettled there;—and peaches, which now grow wild in every corner, and flouriſh with a luxuriance unknown

in

in every other country, were only introduced into theſe regions by the firſt ſettlers from hence :—And it is but of yeſterday that the firſt handful of rice was accidentally brought into Carolina ; where it has ſince proſpered ſo exceedingly, as to enable the inhabitants of that country to ſupply almoſt all the markets of Europe and the Weſt Indies with that uſeful grain.—In ſhort, the benefits that ſociety hath reaped from judiciouſly tranſporting the animals or vegetables of one country into another that might ſtand in need of them, are ſo many and great, as might fill whole volumes barely to enumerate ; and ought to ſerve as a ſtrong incitement to us to attempt ſuch farther improvements in this reſpect, as well informed reaſon may point out as uſeful.

It likewiſe happens to be too univerſally believed, that the peculiar qualities of any breed of any domeſtic animals that may have continued long in any one diſtrict, are chiefly to be attributed to the nature of the paſture,

ſture, or ſome other peculiarities of the ſoil or climate of that diſtrict, and not to any difference in the primitive qualities of the original breed of animals.—Thus, an inhabitant of Lincolnſhire fondly imagines, that the fineneſs of the wool that his ſheep produces, is owing to the peculiar temperature of the air which that county enjoys, or the nature of the paſture that there abounds.—A native of Cornwall as ſincerely believes that the very coarſe fleeces that his flocks afford, are to be attributed to ſimilar cauſes: In which opinion, each of them is ſtrongly confirmed by obſerving, that, if any ſheep are introduced into either of theſe counties from any other diſtrict, that carry wool of a different quality from that of their own, their progeny, in a ſhort time, loſe all thoſe original marks of diſtinction, and can no longer be perceived to differ in any reſpect from their own original breed. From which they, with ſeeming good reaſon, naturally conclude, that

it is in vain for them, in the one caſe, to hope to improve the breed of the country; and that it is equally fooliſh, in the other caſe, to give themſelves any uneaſineſs leſt theirs ſhould degenerate; ſeeing the paſtures or climate of each county will quickly bring any ſtrange breed of ſheep to a perfect equality with their own. And thus each party ſits down contented with his own flock, thinking that it is out of his power to make it better or worſe than it happens to be at the beginning.

I do not, however, know a more fallacious experiment than this, nor one that is attended with more pernicious conſequences to the public; and, therefore, it deſerves to be examined with the moſt ſcrupulous attention.

The fact is undoubtedly true; but the inference that has been drawn from it is probably extremely erroneous. As there ſeems to be the ſtrongeſt reaſon to believe, that the change

change produced upon the progeny of theſe ſtrange ſheep, is to be entirely attributed to the mixture of the blood of theſe with the native ſheep of the country, and perhaps not at all to the influence either of the ſoil or climate.—For, as it is next to impoſſible to keep a few ſheep diſtinct by themſelves in any country during the rutting-ſeaſon, it is not to be doubted, but that the lambs produced by this promiſcuous copulation will participate of the nature, both of the father and mother. And, as this mongrel breed likewiſe intercopulate in their turn with the native ſheep of the country around them, their deſcendants more nearly approximate to the nature of theſe; and the progeny of theſe coming ſtill nearer and more near to the native ſheep of the country in a geometrical progreſſion, it muſt neceſſarily happen, that, in a ſhort time, the qualities that diſtinguiſhed theſe ſtrange ſheep at firſt, being ſo much divided among their deſcendants, become altoge-

together imperceptible to the ſenſes.—In the ſame manner, a drop of milk, mixed with an equal portion of water, becomes ſenſibly diluted; and, if that compound is mixed with a larger quantity of water, it becomes ſtill more and more colourleſs; and, if the ſame operation be repeated ſeveral times, the ſingle drop of milk diſperſed through a whole bucket of water, ſeems to be totally annihilated, and does not ſenſibly diminiſh the tranſparency of that limpid fluid: Although there is no doubt but that the milk is ſtill there preſent, and is no farther altered than by being divided into ſuch minute parts as to elude our ſenſes.

That the change produced upon the deſcendants of theſe ſtrange ſheep is to be attributed to the cauſe above mentioned, and not to the influence of the paſture or climate, ſeems highly probable from this circumſtance, that we frequently meet with diſtinct breeds of ſheep in two neighbouring diſtricts,

diſtricts, that vary very little from one another, either with reſpect to climate or paſtures; as is the caſe with the neighbouring counties of Lincoln and Norfolk;—each of which hath poſſeſſed, for hundreds of years paſt, their own particular breed of ſheep, that are very eaſily diſtinguiſhable from one another; theſe being more effectually kept from intermingling with one another than can uſually happen in two neighbouring counties, by the fens and the waſh that ſeparate them.

But what proves beyond a poſſibility of doubt, that theſe changes are not to be attributed either to the ſoil or climate, but merely to the intermixture of blood, is, that the original ſheep that come from one diſtrict into another, may remain there as long as you incline, without undergoing any change;—the alteration being only obſerved to take place with regard to their deſcendants.

It is probable that any one of the diſtinguiſhing properties above enumerated, may be

be united with any other of these in the same animal in any proportion. Nor does it appear that we are as yet possessed of any facts that should induce us to believe that any two of these qualities are more usually connected with one another than any other two or more of them; although popular prejudice has, on some occasions, supposed that some of these are more naturally connected with one another than they are with some of the other qualities.—Thus, many are disposed to connect, in their own minds, the idea of fineness of quality of the wool, with smallness of size in the animal; although it does not appear that we are possessed of facts sufficient to confirm their conjecture.—The sheep of Lincolnshire and Romney-marsh are among the largest in England; and carry much finer wool than those of Derbyshire and Northumberland, which are of a much smaller size.—Neither are we to conclude, that largeness of size necessarily produces

fine

fine wool. For the Tees-water ſheep are as large as any of theſe, and afford a wool of a very coarſe quality.

Others are diſpoſed to imagine, that the length of the wool is, in ſome meaſure, connected with the ſize of the ſheep; thinking that ſmall ſheep have always ſhorter wool than thoſe that are larger.—But, neither is this confirmed by experience.—The Dorſetſhire ſheep, which yield ſhort carding wool, have a much larger body than a ſmall breed of black-faced ſheep in the ſouth of Scotland, that carry wool almoſt as long as any in England;—and the ſheep that produce the fineſt ſhort Segovian wool in Spain, I am aſſured, from good authority, are nearly of as large a ſize as the beſt breed of ſheep in Lincolnſhire.—The laſt named ſheep afford a proof that the largeneſs of ſize does not obſtruct the length of the wool; although the Tees-water ſheep, which are much

much larger, do not produce wool of near ſuch length of ſtaple as theſe do.

Others again are more diſpoſed to think, that fineneſs of ſtaple is in a great meaſure connected with the ſhortneſs thereof.—But neither do we here meet with the facts neceſſary to confirm their hypotheſis.—Lincolnſhire wool is much longer than that of Durham, Derbyſhire, or Cornwall, and is at the ſame time of a much finer ſtaple.—The longeſt wool upon the ſame fleece is indeed uſually the coarſeſt part of it; from whence, in all probability, this opinion has been derived.

Others think, that fineneſs of wool is connected with delicacy of conſtitution in the animal:—But this we have no reaſon to imagine from experience. For we do not find that the fine wooled ſheep of Shropſhire, Somerſet, Hampſhire, Kent, Lincoln, or Surrey, are more tenderly treated, or ſubject to more accidents, than the other coarſer wooled ſheep in the kingdom. And, if I might

ven-

venture to ſpeak from my own private experience, I could ſafely affirm, that, after having kept in the ſame flock for ſome years, ſeveral diſtinct breeds of ſheep, ſome of which yielded much coarſer wool than others, it has ſo happened, that the fineſt wooled ſheep have been at all ſeaſons in the beſt order.—From which, however, I would by no means infer, that this is always the caſe. As I make no doubt but that theſe two qualities, fineneſs of wool, and delicacy of conſtitution, may be ſometimes united in the ſame breed, as well as any other two qualities.

Others think, that thoſe ſheep that carry fine wool have neceſſarily a thinner fleece, and conſequently leſs wool in proportion to their ſize, than ſuch as yield coarſer wool.—But neither have I met with any facts that would induce me to believe that this is always the caſe.—The ſheep in my own flock, which have the fineſt wool, yield likewiſe the moſt

weighty fleeces in proportion to their ſize, in the *ratio* at leaſt of three to two.

I might go on and enumerate ſeveral other qualities that have, with as little reaſon as the above, been ſuppoſed to be neceſſarily connected with one another; but, to avoid prolixity, I decline going any farther in this inveſtigation at preſent; hoping I ſhall not be accuſed of precipitancy, if, from the above examples, I ſhould infer,—that we have much reaſon to think that ſometimes one or more of theſe diſtinguiſhing qualities may be found united with ſome other of theſe in one particular breed of ſheep; while theſe ſame qualities may be united with ſome other diſtinguiſhing peculiarities in ſome other breed. And, as this may be varied almoſt to infinity, it ought to put us much upon our guard againſt drawing general concluſions from any particular experiments.

It would ſeem likewiſe that we might naturally infer from the above induction,—

That,

That, ſeeing there may be ſuch an infinite diverſity in this reſpect, no one needs ever to deſpair of being able to improve his own particular breed, ſo long as it is not poſſeſſed of all the valuable qualities that he would wiſh for. As it is poſſible that he may meet with another breed that poſſeſſes theſe qualities he wants, or may get them communicated to his own, by properly croſſing them with others: And that, therefore, inſtead of ſitting down in liſtleſs indolence, truſting entirely to providence for the meliorating his flock, he may have his eyes always open to mark every advantage that fortune may throw in his way, and his reaſoning faculty alive and active, ſo as to diſtinguiſh with accuracy how far any propoſed alteration may be intended with any eſſential improvement, or the reverſe.—If the Corniſh farmer, and others who like himſelf are poſſeſſed of a breed of ſheep yielding very coarſe wool, or ſuch as is mixed with *ſtitchel hair*, (kemps), inſtead

inſtead of ſitting down contented with theſe as the beſt that his ſituation would admit of, had, with a diſcerning attention, ſtudied to better his breed, he might have reaped from thence, long ere now, ſome very eſſential benefits *.

But if, from the above induction, we have room to hope for high degrees of improvement, we likewiſe from thence ſee great reaſon to induce us to proceed in our attempts of this ſort with the moſt cautious circumſpection. Becauſe, if we do not attend to all the collateral qualities, if I may ſo expreſs myſelf, that any particular breed of ſheep may poſſeſs, united with that particular one we wiſh to obtain, it may ſo happen that, for the ſake of that one eſtimable quality, we may ſacrifice ſeveral others of much greater

* I have been informed, and have good reaſon to believe, that the Corniſh hair, as it has been uſually called, has been ſomewhat improved of late, by an attention to improve their breed of ſheep.

greater value *.—But, if we have all theſe important objects in view, and beſtow upon each its proper degree of attention, it is impoſſible but our attempts muſt be attended with ſucceſs †. And, as nothing could ſo much

* Thoſe ſpirited farmers who wiſh to improve the quality of their wool, by introducing fine ſheep from other countries, ought to be on their guard, leſt they thus introduce diſeaſes into their flocks that are not eaſily eradicated.—Of late, an alarming diſeaſe has made its appearance among the ſheep in Lincolnſhire,—improperly called the *rickets*.—It is not infectious by contact—but runs in the blood, and ſeems to be always hereditary.—It never fails to be fatal to all the ſheep that are affected by it, as no ſort of cure has yet been diſcovered for it.

† The very great improvements that have been made upon the breed of horſes in Britain, ought to encourage us to hope that, with an equal degree of attention, we might be able to make a ſtill higher improvement on the nature of our ſheep; as the climate is more favourable to this animal than the horſe.

much tend to facilitate any attempt for an improvement of this ſort, as an exact enumeration of all the particular breeds of ſheep that can be found in this or any other country, with a ſpecial deſcription of all the diſtinguiſhing peculiarities of each, it is very much to be wiſhed that ſuch a thing could be accompliſhed.

Goats are in general much leſs eſteemed than ſheep. Yet, as theſe may be properly kept in ſome ſituations where no other animal could live ſo well, it might be alſo of uſe to have a ſpecial enumeration of the various breeds of this ſpecies of animals, with a particular enumeration of the peculiar qualities of each.—On the mountain called *Sierra de Strella*, near Almeida, in the province of Beira in Portugal, I have been aſſured, that there is a breed of large fine goats, remarkable for yielding a very great quantity of milk;—a gallon, or a gallon and a half Engliſh, (two or three pints Scots,) per day.

day.—Theſe would probably be of great uſe for being taken into ſhips for long voyages, were they introduced into Britain.

Whether the goat of Angora that affords the fine ſilky hair called Mo-hair, be only a variety of the common goat, as Dr Haſlequiſt imagines, or a diſtinct ſpecies by itſelf, ſeems not as yet to have been aſcertained with certainty.—But of this, and ſome others of the ſame claſs of animals, I ſhall have occaſion to ſpeak hereafter.

The peculiar properties of the different breeds of Hogs are as little known as of the other domeſtic animals; and, therefore, deſerve to be enquired into.—The ſmall Chineſe hog is vaſtly different from the large Engliſh breed in ſize and appearance.—But we have as yet no accurate experiments on which we can with certainty rely for aſcertaining the peculiar qualities either of theſe or of the different breeds known in Europe.

XXXV.

It is in general believed, that old paſtures are much more valuable than new.—Is this really the caſe?—If it is,—To what cauſes ought this to be aſcribed?—or, Is there any means of obviating this inconvenience?—What are they?

* * *

That ſome old paſtures may be found which afford a greater abundance of excellent food for quadrupeds than any that are new, is a fact ſo univerſally acknowledged, as hardly to admit of a diſpute;—but there is as little room to doubt that the opinion which in many places ſo much prevails, that every paſture field that is old, is neceſſarily better and more profitable to the community than

than if it were ploughed up and again judiciouſly laid down to graſs, with the ſyſtem of farming that has been engrafted upon it, of abſolutely reſtricting the poſſeſſors of ſuch fields in any caſe from ploughing them up, has been attended with very pernicious conſequences. It is, therefore, of much importance that the falſe principles upon which this opinion is founded ſhould be expoſed, and the erroneous tenets that have been adopted in conſequence thereof be exploded.

It is but about a hundred years ſince the practice of ſowing any kind of graſs-ſeeds was firſt introduced into Britain. And as, before that period, every field, when allowed to remain unploughed, became in time covered with ſuch graſſes as chanced to have their ſeeds or roots in the field, without any effort of the farmer; theſe were called natural graſſes, in oppoſition to thoſe that have been ſince that time propagated by ſowing; which have been called artificial graſſes.—

And, although theſe laſt are in many caſes indigenous plants, and as much natives of the ſoil as any others; yet this inaccurate diſtinction ſtill prevails, and along with it an opinion, that, as thoſe plants that are found to ſpring up ſpontaneouſly in the ſoil are evidently better adapted to it than thoſe that are thus, as they imagine, contrary to the intention of nature, forced upon it; ſo, of conſequence, it is better to allow theſe quietly to eſtabliſh themſelves, than to force them to give way to ſtrangers.

This mode of reaſoning has probably induced many to imagine, that every attempt to improve our paſtures, by ſowing what they call artificial graſs-ſeeds, will be without ſucceſs:—In which opinion they are farther confirmed by remarking, that thoſe fields that have been attempted to be laid out for paſture, and have been ſowed with the ſeeds of theſe artificial graſſes, have hardly in any caſe produced a pile ſo cloſe or fine

as

as what is frequently remarked in thoſe old paſtures which bountiful nature hath clothed with her moſt valuable robe.

It will not, however, be alledged, that our fields, if left to themſelves, will furniſh ſuch abundant crops of cutting-graſs or valuable hay, as may with certainty be obtained from them by cultivating ſome of theſe artificial graſſes; ſo that we have the fulleſt proof that nature may in this caſe be improved upon. And, although it is certain that none of the graſſes that have been hitherto cultivated by the farmer, are of the moſt proper kind for paſturage; yet there is little reaſon to doubt, but that many of the moſt valuable kinds for this purpoſe would admit of being cultivated with the ſame eaſe as ſome of thoſe are with which we are well acquainted, if they were properly ſeparated from others, and cultivated with equal care.

But, ſo long as we ſhall remain ignorant of the peculiar qualities of each kind of graſs,

graſs, ſo as not to be able to diſtinguiſh the good from the bad, it is not ſurpriſing, that we ſhould remain firmly perſuaded that nature alone can provide valuable paſtures, and that age is ſo eſſentially neceſſary for bringing them to their ultimate perfection.—For, if we allow our fields to remain uncultivated, without having ſowed them with any kind of graſs-ſeeds, it muſt ever happen, that the ſeeds of ſuch graſſes as are brought by the wind or otherwiſe from the neighbouring fields, will there take root, and in time eſtabliſh themſelves.—And, as it may ſometimes happen, that ſome of the moſt valuable paſture graſſes may there abound, the field, in theſe caſes, will become filled with their ſeeds, and in due time may afford the moſt valuable paſture. But, if bad kinds of graſſes ſhould abound in the neighbourhood more than the good, the field will as naturally become filled with the ſeeds of theſe uſeleſs plants.

—And,

—And, as a number of theſe are hardy and abiding plants, if the field is once filled with them, the paſture will be of conſequence always of little value, if it ſhould be allowed to remain undiſturbed for any length of time.

Thus we ſee that the only difference between natural and artificial graſſes is, that, in the laſt caſe, the ſeeds are ſown in ſuch quantities by the huſbandman, and ſo properly diſpoſed for vegetating, that they come up at once in ſuch abundance, as to fill the whole field entirely, without allowing room for other graſſes to ſpring up in any conſiderable proportion among them ;—whereas, in the firſt, the ſeeds are only ſlowly and ſcantily brought by the winds, and expoſed unprotected to all the viciſſitudes of weather; ſo that it is long before the field becomes fully ſtocked with them, and muſt at laſt be filled with ſuch ſorts as may be the moſt hardy that chance to be in the neighbourhood, whether they be good or bad.

And

And as in theſe circumſtances the roots of ſhort-lived graſs, ſuch as couch-graſs,—knot-graſs,—narrow-leaved ſorrel,—wild-mint,—and others of that ſort, that are uſually found in looſe cultivated ground, being allowed to ſpread without interruption; and as they have, in this caſe, no other plants to contend with, they advance for a year or two after the field is laid into graſs with the greateſt luxuriance; ſo that the firſt two or three crops of graſs on ſuch fields conſiſt almoſt entirely of theſe, together with ſuch annual weeds as ſpring up in ſuch uncultivated fields. And it is only after theſe plants gradually die away that the weaker and more valuable perennial graſſes begin to eſtabliſh themſelves, and the paſture becomes gradually better, if circumſtances ſhould have concurred to eſtabliſh the ſeeds of theſe valuable graſſes in that field.

Thus

Thus we diſcover the reaſon why natural paſtures never can be ſo good when they are new as they may become afterwards. —Whether the ſame objections lie againſt artificial paſtures is not ſo certain.

The above will be acknowledged to be a fair and genuine account of the eſtabliſhment and progreſs of a field of natural graſs; and well demands the ſerious attention of the reader.—Conſider, I beſeech ye, what are the numerous circumſtances that muſt accidentally concur together before it is poſſible to expect a very fine field of paſture-graſs, if left to nature, and then tell me, what is the chance that any one has to expect that all theſe ſhould concur to produce their full effect in any one field whatever.—There muſt be no roots of bad graſſes, nor ſeeds of robuſt annuals in the ſoil when it is left out from tillage.—The ſeeds of the moſt valuable kinds of graſſes muſt be in the neighbourhood in ſuch abundance as to fill the

the whole field ſufficiently at once. Nor is this all.—For as there are no doubt a conſiderable variety of valuable kinds of graſs, ſome of which are naturally fitted to grow to perfection on one kind of ſoil, or upon that ſoil when in certain circumſtances, while others would thrive beſt upon another ſoil, or upon that ſoil only in certain peculiar circumſtances; it muſt ſo happen, that theſe very plants that are beſt adapted to the ſoil in the ſtate that it may be in at the time, ſhould be found in abundance in the neighbourhood of the field.—Neither muſt there be found near that any ſort of robuſt quick-growing plant, the ſeeds of which, by being blown upon that field, might ſuddenly ruſh up and ſuffocate, in their infancy, theſe tender and valuable plants.—Nor muſt there be there found any bad kinds of graſs, that, by being eſtabliſhed along with the good in any proportion, might tend to diminiſh the value of the paſture.—Now, let any one reflect

flect on the infinite diverſity theſe few particulars may admit of, and how utterly impoſſible it is that all the favourable circumſtances, without any of thoſe that are unfavourable, ſhould concur in any one caſe, and he will acknowledge, that thoſe who found their hope of obtaining the moſt valuable paſtures only upon the fortuitous concurrence of all theſe circumſtances, or who imagine that every paſture that is old muſt, on that account, of neceſſity be good, act in direct contradiction to the plaineſt dictates of reaſon and common ſenſe.---For, although it ſhould be allowed, that the graſſes hitherto cultivated are not of the moſt proper ſort for forming good paſtures, and that, therefore, on ſome occaſions much better natural paſtures may be met with than could be formed by means of any of theſe, yet it by no means follows from thence, that, if the farmer were perfectly acquainted with the value and diſtinguiſhing qualities of

each kind of natural graſs, and knew the ſoil and culture that beſt agreed with it,—the moſt proper manner of rearing it, and every other particular relating to the œconomy thereof, he might not perhaps have it in his power to form artificial paſtures as much excelling the natural as theſe laſt at preſent uſually exceed the former.—Becauſe, were he endowed with the knowledge above ſuppoſed, he could at once fill his ſoil with the ſeeds of thoſe valuable graſſes that he knew were beſt adapted to it, and thus effectually exclude the admiſſion of every uſeleſs plant or pernicious kind of graſs that might be brought from the neighbouring fields by the wind, or other accidental cauſes *.

Thus

* I cannot, on this occaſion, omit taking notice of a circumſtance that produces many diſagreeable conſequences, and therefore deſerves a more particular degree of attention than it has hitherto obtained among modern improvers, viz. an inattention to the nature of the plants that grow in the margin of ploughed

Thus it appears that the very beſt ſoils, if allowed to run into natural graſs, may, from

ploughed fields, and other waſte corners of the farm. Theſe places are often filled with docks—ragwort—thiſtles—and other uſeleſs or pernicious plants, which are allowed to remain undiſturbed till the ſeeds are brought to perfection, and diſperſed by the wind through every corner of the farm, where they ſpring up in abundance, to the infinite prejudice of every uſeful crop, and the ruin of the farmer, whoſe attempts to clean and enrich his fields are thus perpetually fruſtrated; for the richer and cleaner his ground is, it is the fitter for rearing theſe pernicious weeds with greater luxuriance. Every man, therefore, who hopes to be benefited by his labours, ought to be peculiarly attentive to ſee that every bad plant be cut down before it comes to flower, in every part of his farm.—One thiſtle—or ragweed, that eſcapes in a neglected corner, may produce ſeeds enough to ſtock a whole field; and the ſeeds are ſo light, that they are diſperſed to an amazing diſtance around; ſo that it is of the utmoſt conſequence that none of them eſcape.

This

from accidental cauſes, become ſtocked with a variety of bad and unprofitable plants, ſo as

This is a ſort of attention that no man ought to neglect :—But the farmer, who wiſhes to reap the full value of his grounds, may go one ſtep farther, and make theſe borders of his fields prove beneficial, inſtead of hurtful. With this view, he ought to dig, manure, and lay perfectly level the borders round all his incloſures, and ſow it down with proper graſs-ſeeds once for all. If it is made ſmooth, it will ſerve for a proper and agreeable walk ;—if it is made rich, the graſs will become ſo luxuriant as to admit of being cut by the ſcythe while the field is in corn ;—and, if it is filled with proper kinds of graſs, it may help to ſtock his fields with valuable plants, inſtead of pernicious weeds.

To make the farmer underſtand the full import of this laſt hint, it is neceſſary he ſhould be informed, that there are many valuable plants and graſſes whoſe ſeeds cannot be ſaved without ſome trouble, that might be readily diſſeminated through the fields if the borders were filled with theſe.—Of this ſort is the ſoft graſs, (Holcus lanatus) already taken notice of—and the yarrow plant ; whoſe ſeeds may indeed be

as to remain for ever a coarſe and diſagreeable paſture. In which caſe an abſolute reſtriction from ploughing, and thus giving it, at leaſt, another chance of being ſtocked with better plants, or producing other more profitable crops, muſt be conſidered as an eſſential detriment to the public.

But this may be looked upon as a favourable caſe, in compariſon of many others that daily occur, from an injudicious attachment

be collected by hand, but which would be more eaſily diſſeminated by the wind, if allowed to ripen in the borders—for it is as light and chaffy as the ragwort ſeeds.—If theſe were allowed to ripen and ſhed their ſeeds that ſeaſon that the field was to be laid out for graſs, it is not to be doubted but many of the plants would ſpring up in the fields while under paſture.

There are many other plants whoſe ſeeds can hardly be at all collected by the hand in ſufficient quantities, that might, on many occaſions, be planted in our fields by this means, if duly attended to.

tachment to this erroneous principle.—For, although it is uſually admitted as an indiſputable axiom in agriculture, that, ſo long as ground remains in paſture-graſs, it is always in an improving ſtate,—the ſoil neceſſarily becoming richer and richer every year; which is not ſuppoſed to be, in general, the caſe with regard to ploughed grounds; it is therefore inferred, that thoſe who abſolutely prohibit the converting any of their graſs-grounds into tillage, act a wiſe and patriotic part; in ſo far, at leaſt, as that they neceſſarily tranſmit to their poſterity a ſubject richer and more valuable than they received.---Yet, I imagine, there will be found much reaſon to apprehend, that the truth of the axiom may be juſtly diſputed; and that the inference that has been drawn from it may be erroneous.

That a ſoil, which is naturally fertile and in good order, may be meliorated by being allowed to remain long in paſture, if it be ſtocked

ſtocked with valuable kinds of graſſes, will be readily allowed. But, if it is naturally unfertile, or diſpoſed to produce ſeveral kinds of bad and unprofitable plants, inſtead of becoming richer, by remaining long in graſs, I am well ſatisfied, from numberleſs obſervations, that, in many caſes, it gradually grows worſe than at firſt, and not only affords leſs food for animals than at ſome former period, but even becomes leſs fitted for producing abundant crops of grain at any time to come, than it would have been if it had been ſooner converted into corn ground.

Thoſe who are diſpoſed to be ſtartled at the ſeeming novelty of this opinion, will pleaſe to recollect, that, if ground muſt neceſſarily be improved, by being allowed to remain in graſs, without any regard to the ſtate that it might be in at the time that it was firſt allowed to remain undiſturbed by the plough, it would of neceſſity follow, that

that all waſtes, commons, and other barren patches of ground that have, ever ſince the creation, been allowed to produce the plants that naturally ſpring up upon them, muſt be conſtantly improving, and becoming gradually richer and richer every day.—A circumſtance that, I believe, no man in his ſober ſenſes will take upon him ſeriouſly to affirm.

But that theſe, in many caſes, not only do not improve, but actually grow worſe and worſe, if certain plants are allowed to grow upon them, ſeems to be pretty evident from the preſent ſtate of many parts of Scotland, that were deſerted about the beginning of this century, in conſequence of a ſevere famine that then prevailed in the land, and have been allowed to remain uncultivated ever ſince; in conſequence of which they have become gradually covered with heath, and not only afford very little graſs for paſture, but have become in a great meaſure

meaſure unfit for bearing corn of any ſort. —For, wherever heath abounds, there is generated, by the rotting of the leaves and roots of this plant, a peculiar kind of black earth, that is not only of itſelf ſteril, but has alſo a powerful tendency to render any ſoil with which it may be mixed unfertile; inſomuch, that the moſt effectual way to improve ground upon which this plant has grown, is to bury that earth entirely by trenching, which, on many other occaſions, would be rather hurtful than beneficial *.—

* The reader is deſired to attend to this diſtinction.—If he is an inhabitant of a rich corn country, he will be convinced, from experience, that trenching corn-ground is in general hurtful.—If he lives in a barren mooriſh country, he will as naturally be inclined to believe that trenching is almoſt in all caſes a capital improvement.—Ought not this to teach farmers, who have been confined to one diſtrict, to be cautious how they criticiſe, with contemptuous aſperity, the general conduct of thoſe of another diſtrict, poſ-

Now, as it ſeems to be pretty certain that this plant naturally tends to deteriorate the ſoil

poſſeſſing a ſoil of a different nature, or in a different ſtate from their own? I hardly know a more helpleſs creature, or one who would deſerve more to be pitied, than a mere practical farmer, who ſhould move from a rich highly improved ſoil, in a good climate, to poſſeſs a farm in an unimproved country, where the ſoil and climate were naturally bad, and manures without his reach.—If this laſt obſervation be well founded, ought it not to make us entertain a doubt, if the practice lately introduced into ſome of the unimproved parts of Scotland, of gentlemen ſending their ſons to the moſt improved counties in England, to learn the practice of agriculture, will be attended with all the beneficial conſequences that are at firſt expected to ariſe from it?—In an unimproved country, a farmer has numberleſs difficulties to encounter that are not known or dreamed of in one where agriculture has been long practiſed with ſucceſs.—And is it in the lap of eaſe, and in the midſt of abundance, that one learns beſt to ſuffer hardſhips with fortitude, and overcome difficulties by perſeverance? Is it within the walls of a garriſon that a general may beſt learn the art of war? or, is it not rather

ſoil upon which it grows, What proof have we that there is no other plant that may be poſ-

rather in the field, where dangers ſurround him on every hand, while oppoſed by a vigilant and active commander, that he learns that much prized art of deſtruction?—It is nearly the ſame with a farmer in an unimproved country.—He is ſurrounded with ſo many difficulties—meets with ſuch powerful interruptions at every ſtep—and muſt proceed ſo ſlowly and cautiouſly in all his operations, as would totally overcome the ſpirit of one who had been accuſtomed to live in a happier ſituation.—If one hopes to practiſe farming in theſe circumſtances, with the ſmalleſt proſpect of ſucceſs, he muſt not only be poſſeſſed of a ſagacious penetration in diſtinguiſhing with preciſion the nature of the different ſoils he may meet with, and the crops that each of theſe will beſt carry, but a ſolidity of judgment, and an unbiaſſed impartiality of mind, that may enable him to vary his practice ſo as to ſuit the nature of that ſoil, and make it produce perhaps the only crop that it is fitted to rear:—A ſpecies of knowledge that muſt be ſelf-taught—as neither the experience of his anceſtors—his neighbours—nor the beſt farmers in another ſituation, can avail him any thing.

poſſeſſed of a ſimilar deſtructive quality? —And, as it is found, that, in many parts of

thing.—He muſt likewiſe be poſſeſſed of a coolneſs of temper that is not apt to be ſtartled at meeting with unforeſeen obſtructions, and an obſtinate induſtry that perſiſts till theſe are overcome, however great and numerous they may be—a verſatility of genius, fitted to adapt itſelf at once to the circumſtances that may occur, ſo as to ſeize every advantage that fortune may throw in his way—a patient forbearance, and vigilant foreſight, that may perceive difficulties at a diſtance, ſo as to guard againſt them, before they come to preſs with irreſiſtible power;—and a moderation in his deſires, that can be contented with little on all occaſions.

With all theſe qualities, a man, in many ſituations, may be reckoned fortunate, if, after a long life ſpent in the moſt vigorous exertions, and perſevering induſtry, he can bring his fields into ſuch order, as barely to admit of beginning to introduce ſome of thoſe modes of culture that were fully eſtabliſhed in the improved diſtrict, which was propoſed as a model to him in his early years. Is it proper to ſend a young man who has ſuch a rugged ſcene to encounter, to the

of the country where the ſoil is naturally unfertile, the graſs, in a few years after the field

the ſmooth and fertile fields of plenty?—Is it fit to inſpire his youthful mind with a taſte of thoſe ſweets that he is doomed never to enjoy?—Is it wiſe to ſend one to learn to overcome difficulties, to a place where none of theſe difficulties ever occur?—Is not ſuch a plan apt to inſpire the youthful mind with a vain and preſumptuous confidence of ſucceſs, that is in danger of making it engage in chimerical plans of improvement that can never be realiſed—which end in diſappointment and chagrin—perhaps in utter ruin and miſery?

I have been induced to delineate this faithful picture, from having ſeen it too fatally realiſed in more inſtances than one;—and from having obſerved that ſome writers of late have exerted themſelves to the utmoſt, to endeavour to promote ſuch chimerical projects—It is painful to ſee individuals hurt by improper ideas getting poſſeſſion of their mind—but it is ſtill more painful to ſee a whole nation labouring under inconveniencies that are produced by this means, and not endeavour to remove them.—Thouſands

field has been allowed to remain untilled, becomes gradually more ſcanty than it was; and

ſands in Scotland are at this moment groaning in miſery, in a great meaſure from this cauſe.

Thoſe who have been accuſtomed to live in the regions of plenty—of induſtry and knowledge—who have been uſed to ſee abundant crops waving in luxuriance on their fields—who look with contempt on the unſkilfulneſs, and laugh at what they deem the puny attempts at improvement of thoſe who live in barren countries, will no doubt accuſe me of prejudice, ſhould I give it as my opinion, that, with half the genius—half the application and induſtry—half the knowledge—half the money—and one tenth of the time, a farmer who lives in a rich country, already forward in culture, may bring all his fields into ſuch order as to carry onions, or any other garden-crop, before one who, in certain circumſtances, undertakes to improve barren and uncultivated ground, will be able to bring it to bear tolerable crops of any kind of corn or graſs.—Yet, if I can truſt to my own moſt attentive obſervation and experience, this is undoubtedly the caſe.

Let

and that the fields are not rendered more fit for producing corn, by being allowed to remain a long time in that ſtate after that period, it would ſeem that we have ſufficient reaſon to conclude, that thoſe only who poſſeſs a ſoil naturally fertile, can expect that it will be meliorated merely by being allowed to

Let it not, however, be imagined, that I mean to inſinuate that a farmer can gain no advantage by travelling into a country where there are more improvements than in that where he reſides.—Nothing can be farther from my intention.—I would only wiſh to inculcate this uſeful maxim, that it might with juſtice be applied to all kinds of travelling,—That it is not the young and inexperienced who can be properly inſtructed by this means—but thoſe who have already made ſome progreſs in thoſe arts or ſciences that they wiſh to be inſtructed in—whoſe experience has taught them caution, and whoſe habit of attention has enabled them to ſelect with judgment, and adopt with a wiſe diſcrimination, ſuch particulars only as they know can be applied to their own particular purpoſes—and rejecting the others as uſeleſs or pernicious.

to remain for a great length of time without culture; and that thoſe who poſſeſs paſtures that are naturally very rich, or that do not abound with the moſt valuable kinds of graſs, are not only guilty of great want of oeconomy with reſpect to themſelves and families, but eſſentially hurt the intereſt of the ſtate, by either neglecting to improve theſe fields by tillage themſelves,—or depriving others of the liberty of doing it.—Nor are thoſe leſs excuſable, who, poſſeſſing fields perhaps naturally of very great value, ſuffer them to be over-run with a moſt deſtructive vermine, that ſoon convert the fineſt paſture into a moſt deſert waſte, and yet refuſe to grant liberty to plough up theſe fields; which is the only certain and moſt oeconomical way of totally clearing a field of ants, where the ſituation does not admit of laying it totally under water till they be all deſtroyed *.

Let

* Scotland is not in general ſo much peſtered with ants as England is; but, in ſome places there, this inſect

Let us, therefore, inſtead of contenting ourſelves on all occaſions with ſuch paſtures

inſect is ſo exceedingly pernicious, as to prove a moſt grievous peſt to ſociety;—nor are the palliative methods of eradicating theſe inſects, uſually practiced by improving farmers, by any means efficacious.

Much ingenuity has been diſplayed in inventing inſtruments for cutting up the ſurface of the hills, and ſmoothing the fields;—and they have in ſome caſes been brought to ſuch perfection, as to effectuate this very well, at a moderate expence;—but, after the farmer has ſmoothed his field, and burnt the hills, and thus, as he imagines, effectually deſtroyed all the vermine, and their eggs, he has the mortification to find that, in a very ſhort time, his field becomes uneven, and, before it is ſufficiently ſtocked with graſs, the ſame operation needs to be repeated.

This operation, for many reaſons, is ordered to be performed in winter, and early in the ſpring; for few perſons chooſe, if poſſible, to loſe the whole produce of the ſeaſon, by doing it in ſummer. It is likewiſe imagined that, by cutting up the hills during the ſevere weather in winter, the intenſeneſs of the cold

as nature may afford, rather ſtudy to improve thoſe that are indifferent, by endeavouring

cold freezes theſe tender creatures to death; on which account this is thought to be by far the moſt propitious ſeaſon.

But the experienced naturaliſt, who has ſtudied the oeconomy of this *little people* knows that, at that ſeaſon of the year, they have retired ſo far below the ſurface, as to be in no danger of being diſturbed by theſe operations; and have their houſes too well ſecured, to be much incommoded by the removal of their hills, which at that time are of no ſort of uſe to them.

A very few of them indeed may be ſcorched by burning the hills, if that is long delayed in the ſpring;—but, as this is an active animal, and can ſuddenly retreat from danger to its inmoſt receſſes, where it cannot be incommoded by the heat of the fires upon the ſurface, ſmall is the benefit produced by this operation. The fires are no ſooner extinguiſhed, than they begin their labours a-freſh with redoubled aſſiduity, and thus fruſtrate the aim of the improver.

Thus,

vouring to obtain a knowledge of ſuch plants as might afford the moſt valuable paſture,

Thus, it appears that the ſeaſon uſually choſen for performing this operation is the moſt unpropitious. If ever they are to be deſtroyed by cutting up the hills, the operation muſt be performed in ſummer, when the hills are their place of abode, and when many of them muſt be deſtroyed by this operation.—But, as they are ſo numerous, many muſt even then make their retreat to the bottom of their holes, and be preſerved.—If this operation, however, was performed about the end of June, or beginning of July, when the young of this animal are in their vermicular and aurelia ſtate, and near the ſurface, the greateſt part of theſe young ones would be deſtroyed;—which would be doing ſomething.—But, when it is conſidered that this creature multiplies ſo faſt,—that ſome of the vermicles and aurelias would be ſaved by the aſſiduous care of the working ants; and that, of the living ants, perhaps not one hundredth part could be by this means deſtroyed, it will be allowed that even this operation, expenſive as it muſt appear to be, is only a ſlight palliative at beſt;—and that no effectual cure remains ſo adviſeable, as ploughing the field

ſture, and cultivating theſe with aſſiduity and care.

The inattention of the improving farmers in Great Britain to this ſubject has been truly amazing.—But it is hoped the attempt that has been made by the ingenious Mr Stillingfleet, will be in time attended with the deſirable effect of turning their attention to a ſubject of ſuch great importance; with regard to which they will then doubtleſs make many valuable improvements.—It is, however, to be feared, that, till ſome attempt ſhall be made to aſcertain the particular qualities and peculiarities of the different kinds of graſſes, as is pointed out in the firſt and following Diſquiſitions in this Eſſay, the public will be often impoſed upon by ſpecious accounts of new graſſes, which may be really poſ-

field up,—or ſpreading a ſtream of water over the ſurface of it; which will in all caſes deſtroy them moſt effectually.

poſſeſſed of few valuable qualities, and may very much tend to diſcourage the inquirer. —This ought not, however, to prevent ſuch as may have had an opportunity of making any obſervations on this ſubject, from communicating them to the public, as they may always be of ſome uſe in helping to augment, in a ſmall degree, the general ſtock of knowledge.

For this reaſon, I ſcruple not to communicate the following remarks relating to this ſubject that have occurred to myſelf.—At the ſame time, I beg leave to caution the reader, as well with regard to myſelf as every other perſon who may write on this ſubject, to attend to what is ſaid with ſome degree of diffidence; and not at once to indulge, without reſtraint, the pleaſing ideas that may preſent themſelves to his imagination on peruſing theſe accounts.—For, although the writer may be as ingenuous as poſſible, yet the mind is ſo apt to be hurried

ried forward with too much precipitancy when it contemplates profpects of this fort, that it is next to impoffible he fhould avoid falling into fome miftakes, that time and a more enlarged experience will afterwards difcover and correct.

In the mean time, it were much to be wifhed that both the writer and reader would ftrenuoufly endeavour to difcover what are the particular purpofes for which any one plant could be deemed valuable, and in what refpects it might be looked upon as of no value at all.—For, as there is no plant that can be alike ufeful on all occafions, if we lofe fight of this moft neceffary diftinction, it may often happen, that we may attempt to rear a particular plant for purpofes that it never was fitted to anfwer ; and our want of fuccefs in thefe trials may make it be entirely rejected, even in cafes for which it was extremely proper.

But

But this we may rather wiſh for than hope to ſee faithfully put in practice. For the human mind is ſo apt to be dazzled with novelty, that, when a new plant is introduced into agriculture, like a new diſcovered mineral-well, it is cried up as poſſeſſing every valuable quality.—Every one is eager to experience its ſalutary virtues.—It is applied in all caſes, and to all conſtitutions. But, as ſoon as the rage for novelty is ſubſided, experience ſoon ſatisfies the greateſt part of thoſe who have tried it, that they have received no benefit from it; on which account it is cried down as poſſeſſing no virtues at all, and becomes entirely neglected, except by the few whoſe diſeaſes it was fitted to relieve, who, in humble obſcurity, reap the benefits thereof; and, after a courſe of many years, perhaps recommend it to the public notice for thoſe real qualities alone that it indeed poſſeſſes.

Such

Such has been evidently the caſe with regard to ſome plants that have been of late recommended to the attention of the public in too ſanguine a manner. And ſuch I doubt not may be the caſe with ſome of thoſe that I here take notice of, although I have, at leaſt, endeavoured to guard againſt it.

Rye-graſs has been long cultivated in our fields, and it is now, in general, very well known to be but a very indifferent graſs for paſture, on account of the tendency it has to ſend out numerous ſeed-ſtalks very early in the ſeaſon, after which no animal will taſte it; ſo that, unleſs it be for a very ſhort while in the ſpring, when the leaves are tender and ſucculent, it is no longer fit for paſturage;—the ſtalks, after the month of May, becoming withered; ſo that, after that period, the field is uſually covered entirely with theſe dead ſtalks, and remains during the remainder of the ſeaſon with very few ſigns of vegetation of any ſort. It is more-

over

pl. 233.

Ryegras. vulgo

J. Edl. ABoe

over but a ſhort-lived graſs, uſually dying out entirely in five or ſix years. On both which accounts it is by no means to be recommended, in general, as a proper graſs for paſturage.

All graſſes that run chiefly to ſeed-ſtalks would ſeem to be, for the ſame reaſons, improper for that purpoſe; ſo that our reſearches ought to be directed principally to diſcover ſuch graſſes as run chiefly to leaves, and produce but few flower-ſtalks.

It was this quality that firſt recommended the purple feſcue-graſs to the notice of the Writer of this Eſſay, and induced him to try ſome experiments with regard to it.

Botaniſts will readily know this plant.—But, for the ſatisfaction of the farmer, it will not be improper to obſerve, that although this graſs is very often found in old paſtures, yet, as it has but few flower-ſtalks, and as it is eat greedily by all domeſtic ani-

mals, theſe are ſeldom ſuffered to appear, ſo that it uſually remains there unperceived. But it ſeems to be better able to endure the peculiar acrimony of the dung of dogs than almoſt any other plant; and is, therefore, often to be met with in dog-hills, as I call the little hills by road-ſides, where dogs uſually piſs and dung; and as it is allowed to grow there undiſturbed, the farmer may have an opportunity of examining the plant, and becoming acquainted with its appearance.

The leaves are long and ſmall, and appear to be roundiſh, ſomething like a wire. But, upon examination, they are found not to be tubulated, like a reed or ruſh; the ſides of the leaf being only folded together from the middle rib, exactly like the ſtrong bent-graſs upon the ſea ſhore.—The flower-ſtalk is tall, and branches out in the head, a little reſembling the wild oat; only the grains are much ſmaller, and the ear does not

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Purple fescue Grass

J. A. Del.

AB. sc

not ſpread full open, but lies bending a little to one ſide.—The ſtalks are often ſpotted with reddiſh freckles, and the top of the roots are uſually tinged with the ſame colour; from whence it has probably obtained its diſtinctive name of *Feſtuca rubra*, or red (purple) feſcue.

It is often to be met with in old garden-walks; and, as its leaves advance very quickly after cutting, it may uſually be diſcovered above the other graſſes about a week or fortnight after the walks are cut.—Nor do they ſeem only to advance at one ſeaſon, and then ſtop and decay like the rye-graſs, but continue to advance during the whole of the ſummer, even where they are not cut, ſo that they ſometimes attain a very great length. Laſt ſeaſon, 1774, I meaſured a leaf of this graſs that ſprung up in a neglected corner, which was four feet and four inches in length, although not thicker than a ſmall wire.—It is unneceſſary to add, that

theſe

theſe leaves naturally trail upon the ground, unleſs where they meet with ſome accidental ſupport; and that if any quantity of it is ſuffered to grow for a whole ſeaſon without being eat down or cut, the roots of the leaves are almoſt rotted by the overſhading of the tops of the other leaves before the end of the ſeaſon.

This is the appearance and condition of the plant when in its native ſituation; as it is ſeldom diſcovered but in pretty old paſtures.—And as it in that ſtate carries only a very few ſeed ſtalks, it was with ſome difficulty that I could collect a ſmall handful of the ſeed, which I carefully ſowed in a ſmall patch of garden-mold, to try if it could be eaſily cultivated.—It came up as quickly as any other kind of graſs, but was at firſt as ſmall as hairs;—the leaves, however, advanced a-pace, and were, before autumn, when the grain with which they had been ſowed was cut down, about ſixteen

or

or eighteen inches in length; but, having been ſowed very thin, it was neceſſary to pick out ſome other kinds of graſs that came up amongſt it, leſt it might have been choaked by them.—Early next ſpring it advanced with prodigious vigour, and the tufts that were formed from every ſeed became exceeding large, ſo that it quickly filled the whole ground. But now the leaves were almoſt as broad as thoſe of common rye-graſs, and the two ſides only inclined a little towards one another from the mid-rib, without any appearance of roundneſs.—In due time a great many ſeed-ſtalks ſprung out, which attained very nearly to the height of four feet, and produced ſeeds in abundance, which may be as eaſily ſaved as thoſe of common rye-graſs.

The prodigious difference between the appearance of this plant in its native and cultivated ſtate amazed me;—but it was with a good deal of ſatisfaction that I found that

that there would be no difficulty in procuring ſeeds from it, which I had much doubted of at firſt. It would ſeem that nature hath endowed this plant with a ſtrong generative power during its youth, which it gradually loſes as it advances in age, (for the difference perceived in this caſe could not be attributed to the richneſs of the ſoil); and that, on the contrary, when it was old, the leaves advanced with an additional vigour, in proportion to the declining ſtrength of the flower-ſtalks. For the leaves of the young plant ſeldom exceed two feet, whereas numbers of the old leaves were near four feet in length.

From theſe peculiarities in the growth of this plant, it would ſeem to promiſe to be of great uſe to the farmer, as he could reap from a field of it, for the firſt two or three years, as great a weight of hay as he could obtain from any of the culmiferous graſſes; and if he meant afterwards to paſture it, he would

would ſuffer no inconveniencies from the flower-ſtalks; and the ſucculent leaves that continue to vegetate with vigour during the whole ſummer, would at all times furniſh his cattle with abundance of wholeſome food. It has alſo been already remarked, that this graſs riſes as early in the ſpring as rye-graſs, and continues green for the greateſt part of winter, which the other does not.—It is moreover an abiding plant, as it ſeems never to wear out of the ground where it has been once eſtabliſhed. On all which accounts, it appears to me highly to merit the attention of the farmer; and well deſerves to have its ſeveral qualities, and the culture that beſt agrees with it, aſcertained by accurate experiments.

I have likewiſe taken ſome notice, on a former occaſion, of another kind of native graſs of this country that has a juſt claim to a more particular ſhare of the farmer's attention than it has ever yet obtained among us,

us, viz. the ſheeps feſcue-graſs, (*Feſtuca ovina*) ſo much praiſed by the Swediſh naturaliſts for its ſingular value as a paſture-graſs for ſheep; this animal being repreſented as fonder of it than of any other graſs, and fattening upon it more quickly than on any other kind of food whatever. And, indeed, the general appearance of the plant, and its peculiar manner of growth, ſeem very much to favour the accounts that they have given us of it.

This plant is of the ſame family with the former, and agrees with it in ſeveral reſpects; although they may be eaſily diſtinguiſhed from one another.—Its leaves, like the former in its natural ſtate, are always rounded, but much ſmaller; being little bigger than large horſe-hairs, or ſwines briſtles, and ſeldom exceed ſix or ſeven inches in length. But theſe ſpring out of the root in tufts ſo cloſe upon one another, that they reſemble, in this reſpect, a cloſe hair-bruſh

more

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Sheeps Fescue Grass

J. Abbott Allis

more than any thing elſe that I know; ſo that it would ſeem naturally adapted to form that thick ſhort pile of graſs, in which ſheep are well known chiefly to delight.—Its flower-ſtalks are numerous, and ſometimes attain the height of two feet; but are more uſually about twelve or fifteen inches high.

Upon gathering the ſeeds of this plant, and ſowing them as the former, it was found that they ſprung up as quickly as any other kind of graſs; but the leaves are at firſt no bigger than a human hair.—From each ſeed ſprings up one or two of theſe hair-like filaments, that in a ſhort time ſend out new off-ſets, ſo as quickly to form a ſort of tuft, which grows larger and larger till it at length attains a very large ſize, or till all the intervals are cloſed up; and then it forms the cloſeſt pile of graſs that it is poſſible to imagine.—In April and May it

puſhed forth an innumerable quantity of flower-ſtalks, that afforded an immenſe quantity of hay; it being ſo cloſe throughout, that the ſcythe could ſcarcely penetrate it. This was allowed to ſtand till the ſeeds ripened; but the bottom of the ſtalks were quite blanched, and almoſt rotted for want of air before that period.

This was the appearance that it made the firſt year after it was ſowed: But I have reaſon to think, that, after a few years, *it* likewiſe produces fewer ſeed-ſtalks, and a greater quantity of leaves than at firſt. But, however that may be, it is certain, that if theſe are eat down in the ſpring, it does not, like rye-graſs, perſiſt in a continued tendency to run to ſeed; but is at once determined to puſh forth an abundance of leaves, without almoſt any ſtalks at all *.

And

* From this peculiarity it neceſſarily happens, that, if ſheep are allowed to paſture on this graſs in the

And as all domeſtic animals, but more eſpecially ſheep, are extremely fond of this graſs, if they have liberty to paſture where it grows, they bite it ſo cloſe as never to ſuffer almoſt a ſingle ſeed-ſtalk to eſcape them; ſo that the botaniſt will often ſearch in vain for it when he is treading upon it with his feet.—The beſt way to diſcover it in any paſture is, to ſearch for it in winter, when the tufts of it may be eaſily diſtinguiſhed from every other kind of graſs by their extraordinary cloſeneſs, and the deep green colour of the leaves.

It ſeems to grow in almoſt any ſoil, although it is imagined, that it would flouriſh beſt in a light ſpungy ſoil, as it can evidently live with leſs moiſture than almoſt any other kind of graſs; being often ſeen to remain

ſpring, few or no ſeeds can be expected from it that ſeaſon: Plants intended for ſeed ought, therefore, to be preſerved carefully from cattle or ſheep in the winter or ſpring.

main in the ſods that have been employed for coping ſtone-dykes, after all the other graſſes that grew in them have diſappeared. It is likewiſe frequently found on poor barren ſoils, where hardly any other plant can be made to grow at all, and on the ſurface of dry worn out peat moſs, where no moiſture remains ſufficient to ſupport any other plant whatever.—But in neither of theſe ſituations does it thrive; as it is there only a weak and unſightly plant, very unlike what it is when it has the good fortune to be eſtabliſhed upon a good ſoil; although it is ſeldomer met with in this laſt than in the former.

From this laſt circumſtance it appears, that thoſe who imagine that a plant is always found naturally on that ſoil in which it moſt delights, and where it will grow to the utmoſt perfection, may be very often deceived;—as ſome particular circumſtance relating to the œconomy of the plant, may prevent

prevent it from being able to eſtabliſh itſelf in the ſoil in which it would thrive better than any where elſe, if it could have overcome theſe obſtacles that prevent its eſtabliſhment there;—and that, on the contrary, it may naturally appear on other leſs favourable ſoils, merely becauſe it does not in theſe meet with the ſame obſtructions to prevent its eſtabliſhment there.—This, I am ſatisfied, is exactly the caſe with regard to this plant. For, as its firſt ſhoots are extremely weak, it is then eaſily ſurmounted by almoſt every other kind of plant.—And as the ſeeds of other kinds of graſs that may chance to be lodged in a rich ſoil ruſh up with vigour, and ſoon cover the whole ſurface of the ground, the few ſeeds of this kind of graſs that may chance to be carried into theſe fields, are hardly allowed to vegetate before they are entirely ſmothered by the other ſtronger graſſes.

But upon ſuch barren ſoils as aré unfit to rear any other kinds of graſs, the ſeeds of this plant are allowed to come up, and the plants to grow without meeting with the ſame obſtruction; and there they eſtabliſh themſelves from this cauſe, although the ſoil is incapable of affording them afterwards that abundant nouriſhment that is neceſſary to rear the plant to perfection.

I choſe to remark this peculiarity relating to this particular kind of graſs, not only to ſatisfy the reader of the neceſſity of attending to many ſeemingly trifling circumſtances relating to the œconomy of particular plants, but alſo to guard againſt a prejudice that might ariſe in the minds of ſome people, who might chance to take notice of this plant in the ſituation that I have now deſcribed. Where, finding it ſo unlike that thriving ſtate in which I have repreſented it in other paſſages of this article, they might be diſpoſed to doubt the truth of what I have

have alledged.—But, if they would ſatisfy themſelves in this reſpect, let them either tranſplant a few tufts from theſe barren ſoils into a good garden mold, or ſow the ſeeds there, and guard againſt their being choaked with others, and they will ſoon ſee how different the one plant is from the other.

From this fact we may likewiſe draw the following very uſeful corollary:—That, ſeeing it is ſo difficult to meet with a good rich ſoil in ſuch circumſtances as to permit this plant naturally to eſtabliſh itſelf in it,—and ſeeing we have very great reaſon to imagine that this is one of the moſt valuable graſſes that our country produces, we have, from this ſingle inſtance, the cleareſt proof that could be wiſhed for of the impoſſibility of obtaining, on all occaſions, the fineſt paſture, by allowing nature to operate without any aſſiſtance.—Heaven has endowed man with reaſon, that, by the exerciſe thereof he may promote his own felicity; and hath

ſubjected

ſubjected many of thoſe objects that may miniſter to his wants to particular natural inconveniencies that it is in his power to remove, and thus render them more eminently uſeful to him;—of which this may be looked upon as one conſpicuous example. —For, by ſaving the ſeeds of this plant, and ſowing them in ſufficient quantities on a rich ſoil properly prepared, the great number of plants that are thus eſtabliſhed before the ſeeds of others can be brought to the field and made to vegetate, effectually cover the whole ſurface, and exclude the admiſſion of others; ſo that we may thus have a full crop of this valuable plant upon a ſoil in which nature could hardly ever have eſtabliſhed it, and in which alone it can ever arrive at its ultimate perfection.

It may not, however, be improper to remark, as one of the excellencies of this plant, that it will grow upon ſuch ſoils as hardly any other good kind of graſs could

live

live upon. And although the farmer cannot from theſe expect a crop nearly equal to what he will reap from his richer fields, yet it is no ſmall convenience for him to have a plant with which he can at once cover his moſt barren ſpots, which, without this care, might have remained bare for many years.

I will not here repeat what has been already ſaid about the particular property that this plant poſſeſſes of continuing green all winter, nor point out the benefits that the farmer may reap from this valuable quality.—He need not, however, expect to find any verdure in winter on ſuch plants as grow upon the looſe moſſy ſoil above mentioned. For, as the froſt in winter always hoves up the ſurface of this ſoil, the roots of the plants are ſo lacerated thereby, as to make them remain for ſome time in the ſpring to all appearance dead.—Nor will he often perceive much verdure in winter upon

thoſe plants that grow upon poor hungry ſoils, which cannot afford abundant nouriſhment to keep them in a proper ſtate of vegetation at all times.—But ſuch plants as grow on earthen dikes, which uſually begin to vegetate with vigour when the autumnal rains come on, for the moſt part retain their verdure at that ſeaſon almoſt as well as if they were in good garden-mold.

I have been very particular with regard to this plant; becauſe, in ſo far as my obſervations have yet gone, it promiſes on many accounts to make a moſt valuable acquiſition to the farmer; and, therefore, juſtly demands a very particular ſhare of his attention.—

Another very valuable paſture-graſs is what I would call the vernal ſoft-graſs,—the *Holcus lanatus*, or creeping ſoft-graſs of Hudſon.—No graſs makes a more beautiful appearance in the ſpring than this does.—The lively verdure and cloſeneſs of the pile, and the ſoftneſs and ſucculent richneſs of the leaf,

con-

p 250 Tab. 5

Creeping Soft Grass

I. A del. A.B. Sc

convey the moſt pleaſing idea to the mind that could be deſired; and ſeem to give it a juſt title to be conſidered as one of the moſt valuable kinds of meadow-graſſes *.

It delights ſo much in moiſture, that it is ſeldom found on dry ground, unleſs the ſoil is exceeding rich.—It is often found upon thoſe patches near ſprings, over which the water frequently flows; and may be eaſily known by the uncommon ſoftneſs and ſucculence of the blade;—the lively light green-colour of the leaves, and the matted inter-texture of its roots. But, notwithſtanding of the ſoftneſs of its firſt leaves,—when the ſeed-ſtalks advance, they are rough to the touch, ſo that the plant then aſſumes a very differ-

* I do not hear mean to claſs this plant among the *Poa* tribe of graſſes, which, in Engliſh, have no other name but *meadow-graſs*——It is only meant to ſay, that it is one of the moſt valuable kinds of graſs that naturally grow in our meadows.

different appearance from what we would have expected.—The ear is branched out into a great number of fine ramifications ſomewhat like the oat, but infinitely ſmaller; and, when the ſeeds are ripe, they are inveloped in a ſoft kind of membrane that makes them adhere to the ſtalk, and to one another, after they are ſeparated from it, as if they were intermixed with cobweb.—Some of theſe ſeeds were ſaved and ſowed by themſelves, which came up extremely well;—but, on account of that filamentous membrane that makes them adhere to one another, it is extremely difficult to get them to ſpread readily in ſowing: And, as the ſeed is ſmall, and adheres very cloſely to the ſtalk, it is difficult to get it ſeparated from thence. On both which accounts, it ſeemed to me, that it would not be eaſy to cultivate it artificially. —But, if any contrivance could be got to clean the ſeeds at a moderate expence, a very ſmall quantity of theſe would probably be ſuf-

ſufficient to ſtock a rich meadow with it. For, although it were ſowed very thin, it ſpreads ſo faſt by its running roots, as would in a ſhort time ſtock the field abundantly.

Another plant that promiſes, on ſome occaſions, to afford a valuable paſture-graſs, is the bulbous foxtail-graſs;—the *Alopecurus bulboſus* of Hudſon.—Its leaves are broad, ſoft, and ſucculent; and feel a little woolly to the touch. Theſe ſpring out in great abundance from a ſtrong, firm, matted kind of root; and if they are cut over at any time during ſummer, they very quickly advance again, ſo as to get above almoſt all the other kinds of graſſes.—The ſeed-ſtalk is long, and very ſtrong, being between four and five feet high, and is crowned with a round bruſh-like ſoft head, which conſiſts almoſt entirely of light ſcaly-like ſeeds.—But, like the purple feſcue, it ſends out but very few flower-ſtalks; ſo that a crop of it allowed to come to ſeed, aſſumes but a very thin, ſtraggling,

gling, and unſightly appearance.—In other reſpects, it much reſembles the whole plant lately introduced from America, known by the name of Timothy-graſs,—only, its leaves are ſofter, and of a darker green-colour,—and the head is likewiſe ſoft and ſcaly, inſtead of being hard, and, in ſome degree, prickly; as is the caſe with Timothy-graſs. The ſeeds alſo are exceeding ſoft and chaffy, very unlike the firm round ſeeds of Timothy-graſs.

It ſeems to delight chiefly in a moiſt ſoil; and, therefore, promiſes to be only fit for a meadow-paſture-graſs. The quality that firſt recommended it to my notice, was the unuſual firmneſs that its matted roots gave to the ſurface of the ground, naturally ſoft and moiſt, in which it grew; which ſeemed to promiſe that it might be of uſe upon ſuch ſoils, chiefly in preventing them from being much poached by the feet of cattle which may

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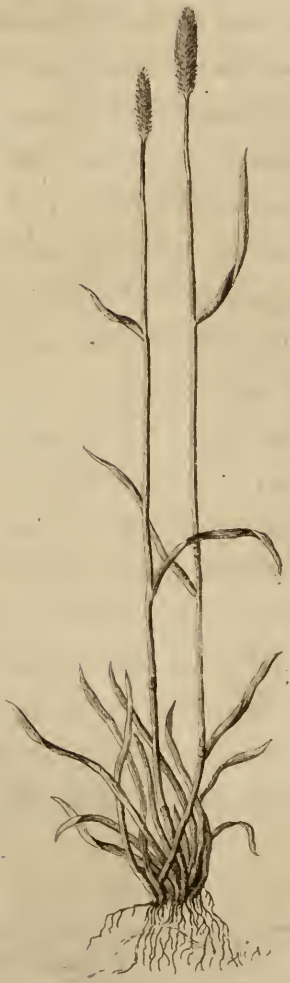


R.A.D.N Bulbous Foxtail grass A.B.Sc.

may paſture upon them.—Moſſy ſoils * eſpecially are ſo much hurt by poaching, that any thing that promiſes to be of uſe in preventing it, deſerves to be attended to.

The ſeeds were ſowed in garden-mold, and came up very well; but I have not yet obtained a ſufficient quantity of theſe to try how it would anſwer for the purpoſe that I had chiefly in view when I thought of cultivating it. I have remarked that the ſtalks of this plant are extremely tough and flexible when made into hay, ſo as to be better fitted for making ropes for faſtening thatch with, than any other plant I have yet ſeen.

If my experience with regard to Timothy-graſs had been ſufficiently extenſive as to enable me to ſpeak of its qualities with certainty, I would have here enumerated them. —But, having found no reaſon, from the trials

* By moſſy ſoils is here meant ſuch as contain turf or peat. The Iriſh would call theſe bogs.

als that I made of it, to think that it promiſed to be of very great value; and, being ſenſible that the attention of the public was already directed towards it, I left others to make the neceſſary experiments with regard to it.—And I only mention it here, leſt ſome might have thought it an omiſſion.

The great meadow-graſs,—the *Poa pratenſis* of Hudſon, ſeems to approach in many reſpects to the nature of the purple-feſcue, only that its leaves are broader, and not near ſo long; being only about a foot or ſixteen inches at their greateſt length.—Like it, it produces few ſeed-ſtalks, and many leaves, and is an abiding plant.—But I have not yet had an opportunity of trying the effects of culture upon it;—having only ſaved the ſeeds of it for the firſt time laſt ſeaſon.

The creeping meadow-graſs,—the *Poa repens* of Hudſon, ſeems to be the moſt valuable graſs of any of this genus.—Its leaves are firm and ſucculent,—of a dark Saxon-green

p. 415. Tab. 7.

Great Meadow Grass

green colour; and grow ſo cloſe upon one another as to form the richeſt pile of paſture-graſs.—The flower-ſtalks, if ſuffered to grow, appear in ſufficient quantities; but the growth of theſe does not prevent the growth of the leaves; both advancing together during the whole ſummer, and when the ſtalks fade, the leaves continue as green as before *.

* Culmiferous graſſes might be divided into two general claſſes for the purpoſes of the farmer, that it might be of uſe for him to attend to; viz. 1*ſt*, Thoſe which, like the common annual kinds of corn, run chiefly to ſeed-ſtalks; the leaves gradually decaying as theſe advance towards perfection, and become totally withered, or fall off entirely, when the ſeeds are ripe. Rye-graſs belongs to this claſs in the ſtricteſt ſenſe. To it likewiſe may be aſſigned the vernal-graſs, dogs-tail-graſs,—and fine bent-graſs. 2*d*, Thoſe whoſe leaves continue to advance even after the ſeed-ſtalks are formed, and retain their verdure and ſucculence during the whole ſeaſon, as is the caſe with the Feſcue, and Poa tribe of graſſes, whoſe leaves are as green and ſucculent when the ſeeds are ripe and the flower-ſtalks fading, as at any other time.

—Its leaves are much larger, and more abundant than the common meadow-grafs, *Poa trivialis*; and, therefore, it better deferves to be cultivated.—This defcription is taken from the plant in its native ftate.—How it may be altered by culture I know not.

I have attempted to fave fome feeds of this plant for two years fucceffively, but have never been able to get them in any other way than by gathering with the hand; which is a troublefome and tedious operation: And, if the feafon is rainy, or the ground on which the grafs grows is very rich, it is difficult to obtain the feeds, even in this way.—For, as the leaves continue, in thefe cafes, to grow with luxuriance, they overtop the feed-ftalks before the feeds are ripe: And, as the leaves are fo clofe upon one another, both them and the ftalks are often rotted in thefe circumftances, before the feeds are ripe.

This is perhaps one of the moft valuable kinds of paſture-grafs, and therefore merits a more

p. 416. Tab. 8.

Creeping Meadow Grass

J. A del A. B. scup.

a more than ordinary degree of attention to try if the ſeeds can be obtained in ſuch quantities as to be uſeful to the farmer.—It appears to me, that the only probable way of ſucceeding in this attempt will be, to ſow ſome of the ſeeds upon a clean ſharp piece of ground, naturally dry, and not very rich at the time. If it were once eſtabliſhed on ſuch a ſoil, it would carry abundance of ſeeds every ſeaſon, and there would be little probability that it would be rotted before theſe were ripe. But, as the leaves are for the moſt part higher than the ſtalks before the time of cutting; and, as theſe leaves are extremely ſucculent when cut, it will be proper to make the whole of this ſcanty crop into hay,—put it up in a rick till the ſpring, and then threſh it out.—The ſeeds are light and chaffy, and are neither eaſily ſeparated from the ſtalk, nor diſintangled from the hay; ſo that care muſt be taken that the threſhing and ſhaking are carefully performed.

Theſe

Theſe obſervations are in ſome meaſure applicable to all the graſſes of the *Poa* tribe.

I have already mentioned the vernal-graſs, and the uſe that I apprehended it might be of for giving a rich flavour to milk or butter :—But if, upon trial, it ſhall not be found to poſſeſs that quality, it does not, on any other account that I have as yet obſerved, much deſerve the attention of the farmer. —As a paſture-graſs, it ſeems to be ſubjected to all the inconveniencies of the common rye-graſs ; becauſe, like that, it runs almoſt entirely to flower-ſtalks very early in the ſeaſon ; during the formation of which, the leaves are totally exhauſted, ſo that the cattle muſt either eat theſe or want entirely.—Its leaves do indeed ſpring up after it is cut over, or eat down by cattle, and remain green pretty late in autumn ; but it does not ſeem that ever theſe will yield a very abundant crop ; ſo that it would probably require either to be cut and conſumed green, or made

into

p. 253

Vernal Grass

J. A. delin.

I. B. sculp.

p. 418 Tab. 10

Crested Dogstail Grass

J. A. delin.t

A.B. sculp.

into hay like rye-graſs, if it ſhould ever be deemed worth the cultivating—It may, however, be remarked in its praiſe, that it grows with luxuriance upon a much more indifferent ſoil than many other kinds of graſs; on which account, it might be on ſome occaſions of great value.

Nearly the ſame thing may be ſaid of the creſted dogs-tail-graſs, *Cynoſurus cryſtatus*, commonly known in Scotland by the name of Windleſtraw-graſs, excepting that it poſſeſſes no uncommon taſte or ſmell; but, like the former, it runs chiefly to ſtalks, and has but few leaves, which are ſhort, and remain green pretty late in winter.—I have gathered ſome of the ſeeds of both of theſe, and ſhall ſoon be able to ſpeak of them with a greater degree of certainty.

I am well acquainted with the fine bent-graſs ſo much recommended by Mr Stillingfleet in his Eſſays; but think it is by no means of ſuch uncommon value as he ſeems

to

to imagine.—Cattle and horſes will eat it when pinched for food; but it is with difficulty they can be kept upon a field where this graſs chiefly abounds; ſo that they will leave it if they can, and go to other fields much barer, that contain more palatable graſſes; nor do they almoſt ever grow fat upon it; and therefore, I would not recommend it to the improving farmer. Nor does it appear to me, that the flote-feſcue is of half the value that he has been made to believe.

I was alſo at pains to get ſome ſeeds of the American Cocks-foot-graſs * that was lately advertiſed as of ineſtimable value. Like all the other graſſes of this tribe, it is a ſtrong robuſt plant.—Its leaves are broad, firm, and roughiſh, of a light green colour, but neither are very long nor cloſe upon one another;—its ſtalks riſe thin and ſtraggling;—are ſtrong, and feel rough to the touch,—riſing to the height

* *Dactylus Americanus.*

height of near four feet on a good ſoil.—It does not promiſe either to yield an abundant crop of hay, nor a cloſe pile for paſture ;—nor does its appearance ſeem to indicate that it would be of the moſt palatable ſort for cattle.—The quantity I have is too ſmall to permit me to ſpeak with great certainty.—It ſeems to be a plant that would require a dampiſh ſoil.

All theſe belong to the claſs of culmiferous plants, and are what botaniſts call *Gramina*, or graſſes properly ſo called. But, as there are many other plants that may be employed by the farmer for the ſame uſes as theſe, it is by no means neceſſary that he ſhould confine himſelf to this claſs of plants alone, or be directed in his reſearches by any other rule excepting that of utility.—The following plants, therefore, are pointed out to him, as promiſing to be of ſome uſe on particular occaſions.

Milk-

Milk-vetch,---liquorice-vetch,---or milk-wort, as it is differently called,—the *Aſtragalus glycyphyllos* of Hudſon, is a plant common in every part of the iſland; although it has never yet, that I have heard of, been attempted to be cultivated.

The general appearance of this humble plant is, in ſome reſpects, very like that of the common white-clover; altho' its leaves, upon a nearer examination, are not exactly ſimilar to thoſe of this plant.—From the top of the root there comes out in the ſpring a great number of ſmall ſhoots that ſpread along the ſurface of the ground every way around it; from which ariſe a great many cluſters of bright yellow flowers, exactly reſembling thoſe of common broom in ſhape, ſize, and colour; which are ſucceeded by hard round pods, filled with ſmall kidney-ſhaped ſeeds. And, as three or four of theſe pods uſually adhere to one foot-ſtalk, from which they ſpread open at the points, a little reſem-

p. 420 Tab. II.

Milkwort

reſembling the fingers of an open hand; they have from this circumſtance been by the vulgar, in ſome places, called ladies-fingers *; while others, more ſtruck with the reſemblance that theſe pods bear to the foot of a bird, have diſtinguiſhed it by the name of crow-toes †; and others, from the appearance of the bloſſom, and the part where the plant is found, have called it *feal* ‡, or, by corruption, *fell* broom.

* The reader will pleaſe to obſerve, that this is not the plant which properly bears the Engliſh name of Ladies-fingers—the *Anthyllis* of botaniſts.

† Neither is this the plant that bears the name of Crowfoot properly in Engliſh—which is the *Ranunculus* of botaniſts.

‡ If any ſod is dug from the ſurface of the ground, in which a root of this plant chances to be, and it be put upon the top of a ſunk-fence, wall, or in any other place that is not entirely deſtitute of moiſture, the plant does not die, but ſends out annually great tufts

It is found plentifully almoſt every where in old graſs-fields; but, as every ſpecies of domeſtic animal eats it, almoſt in preference to every other plant, it is ſeldom allowed to come to the flower in paſture-grounds, unleſs where they have been accidentally ſaved from the cattle for ſome time; ſo that it is only about the borders of corn-fields, or the ſides of incloſures to which cattle have not acceſs, that we have an opportunity of obſerving it. As it has been imagined that the cows which feed on theſe paſtures where this abounds, yield a great quantity of rich milk, the plant has from that circumſtance obtained its moſt proper Engliſh name of milk-vetch.

But the circumſtance that firſt recommended it to my notice was, the having obſerved that it grows and flouriſhes in poor barren ground,

tufts of flowers which were not perhaps obſerved on the paſture from which the ſod (ſeal) was dug, which probably firſt ſuggeſted the idea of that name.

ground, where almoſt no other plant can be made to live.—I have ſeen it in the midſt of a barren moor, where the ſoil was ſo poor that even heath, or ling (*erica communis*,) could hardly grow,—and upon bare obdurate clays, where no other plant could be made to vegetate; inſomuch that the ſurface remained entirely uncovered, unleſs where a plant of this kind chanced to be eſtabliſhed; yet, even in theſe unfavourable circumſtances, it flouriſhed with an uncommon degree of luxuriance, and yielded as tender and ſucculent, though, not ſuch abundant ſhoots, which aſſumed as fine a verdure as if they had been reared in the richeſt manured fields.—I have likewiſe ſeen it in dry and barren ſands, where almoſt no other plant could be made to live; and there alſo it ſends out ſuch a number of healthy ſhoots all round, as cover the earth with the cloſeſt and moſt beautiful carpet that can be deſired.

The

The ſtalks of this plant, as has been ſaid, are weak and ſlender, ſo that they ſpread upon the ſurface of the ground, unleſs they are ſupported by ſome other vegetable. In ordinary ſoils, they do not grow to a great length, nor produce a great many flowers; but, in richer fields, the ſtalks grow to a much greater length,—branch out a good deal, but carry few or no flowers or ſeeds; and, as I firſt took notice of it only on poor ſoils, it was purely with a view to paſture that I firſt reſolved to cultivate it; and, with this intention, ſowed it with my ordinary hay-ſeeds, expecting no material benefit from it till I deſiſted from cutting my field; but found myſelf agreeably diſappointed, as it grew the firſt ſeaſon as tall as my great-clover, and formed the fineſt hay I ever ſaw; it being ſcarce diſtinguiſhable from Lucerne, but by the ſlenderneſs of the ſtalk, and proportional ſmallneſs of the leaf.

It is nearly allied to Lucerne in its botanical characters; and reſembles that valuable plant in many other reſpects. Like that, it is perennial,—ſends down a long root to a great depth in the ſoil, which is at firſt ſmall, and gradually increaſes with age, till it at length becomes of a very conſiderable ſize; ſo that it is ſeveral years after it is firſt ſowed before it attains its full perfection: But, when it is once eſtabliſhed, it probably remains there for a prodigious number of years in full vigour, and produces annually a great quantity of fodder. In autumn 1773, I cut the ſtalk from an old plant of it that grew in a very indifferent ſoil; and, after having dried it thoroughly, found that it weighed fourteen ounces and a half. Like Lucerne, it is never affected with the ſevereſt droughts that we experience: But it does not reſemble that plant in delicateneſs of conſtitution, as it thrives in the ſtiffeſt clays, and is able to

ſtand

ſtand its ground among graſs, or any other weeds.

As this plant only produces ſeeds in abundance upon poor hungry ſoils that could hardly afford nouriſhment to any other, and as the ſtalks ſpread out cloſe upon the ſurface of the ground, it ſeems to me, that the greateſt bar to the cultivating thereof will be the difficulty of obtaining the ſeeds in abundance; as in theſe circumſtances they muſt always be gathered by the hand.—But, as it is an abiding plant, thoſe who have ſuch ſoils as moſt ſtand in need of having plants of this ſort ſowed upon them, may be at a little trouble and expence to get them at once *properly* laid down with this graſs, as it will be only once that they will need to do it. It is poſſible, that future experience may diſcover ſome eaſier way of procuring the ſeeds than hath as yet occurred to me.

The ſtalks of this plant die down entirely in winter, and do not come up in the ſpring till

the

the ſame time that clover begins to advance; ſo that it can never be of uſe but as a ſummer-paſture:—Neither does it advance very faſt after it is cut down, or eat over, even in ſummer.—But the great cloſeneſs of the ſhoots may probably counterbalance that defect.

I have ſeen another ſpecies of the *aſtragalus* with an erect ſtalk, that naturally grows upon dampiſh ſoils; but have had no opportunity of making particular obſervations upon it; nor have as yet been able to procure any of its ſeeds.—It ſeems more likely to anſwer well for hay than this does.

The common yellow vetchling, *Lathyrus pratenſis*, or everlaſting-tare, might likewiſe be on many occaſions cultivated with profit by the farmer.—It grows with great luxuriance in ſtiff clayey ſoils, and continues to yield annually, for any length of time, a great weight of forage, which is deemed to be of the very beſt quality. And, as it is equally fit for paſture or for hay, the farmer would have

have it in his power to apply it to the one or the other of theſe uſes, at any period that might beſt ſuit his convenience.—It is likewiſe attended with this farther advantage, that, as it continues to grow with equal vigour in the end of ſummer as in the beginning thereof, it would admit of being paſtured upon in the ſpring, till the middle, or even the end of May, ſhould it be neceſſary, without endangering the loſs of the crop of hay; which cannot poſſibly be done with rye-graſs, or any other plant uſually cultivated by the farmer, except clover; which is equally unfit for early paſture or for hay.—This plant would be the more valuable to the farmer, as it grows to the greateſt perfection on ſuch ſoils as are altogether unfit for producing ſain-foin; the only plant hitherto cultivated that ſeems to poſſeſs qualities approaching to thoſe of this one.

It muſt, however, be acknowledged, that the difficulty of procuring ſeeds of this plant

Yellow Vetchling

in abundance, muſt be a very great bar to the general cultivation thereof. For, altho' theſe ripen very well in our climate, yet the quantity that it produces is ſo inconſiderable, and the difficulty of getting them ſeparated from the pod is ſo great, as to make it neceſſary to gather them by the hand; in which way the quantity obtained muſt be very trifling. —To counterbalance this defect, however, it may be obſerved, that it is not only an abiding plant, which never leaves the ground where it has been once eſtabliſhed, but that it alſo encreaſes ſo faſt by its running roots, that a very few plants at firſt put into a field, would ſoon ſpread over the whole, and ſtock it ſufficiently.—If a ſmall patch of good ground is ſowed with the ſeeds of this plant in rows about a foot diſtance from one another, and the intervals be kept clear of weeds for that ſeaſon, the roots will ſpread ſo much as to fill up the whole patch next year; when the ſtalks may be cut for green fodder, or

for hay. And, if that patch were dug over in the ſpring following, and the roots taken out with the hand, it would furniſh a great quantity of plants, which might be planted in ſuch fields as you meant to have filled with this, at the diſtance of two or three feet a-part; which would probably there take root, and quickly over-ſpread the whole field.—And, as there might always be a ſufficient quantity of the roots left to fill again the patch from whence they are taken, it would be ready to furniſh a freſh ſupply the next ſeaſon, and might thus continue to ſerve as a nurſery for ever afterwards.

It appears to me, that this would be the moſt likely method of propagating this plant with eaſe; but I have not as yet had ſufficient experience thereof to be able either to tell preciſely the expence of it, or to anſwer poſitively for the ſucceſs thereof in all caſes.

The flowers of this kind of vetch grow in a wide ſpike, having pretty long foot-ſtalks;

—are

—are of a bright yellow colour, and are ſucceeded by very flat pods, which are black when ripe, that are ſo tough, and adhere ſo firmly to one another, that they are with difficulty opened; —the ſeeds are flat,—ſmall, of a dark greeniſh grey,—and irregular figure;—round for the moſt part.

The common blue tare is in many reſpects of ſeemingly equal value with the former.—This carries a large cloſe ſpike of bright cerulean coloured flowers, which are ſucceeded by ſmooth white pods, filled with round flatted blackiſh ſeeds, which rattle in the podes when ripe.—The leaves of this plant are much ſmaller and more divided than thoſe of the former; the ſtalks are likewiſe ſmaller, and grow to a much greater length.—It produces a much greater quantity of ſeeds; but the ſmall birds are ſo fond of them, that, unleſs the field is carefully guarded, few of the ſeeds are allowed to ripen; but, if they were guarded from that enemy, they might be eaſily

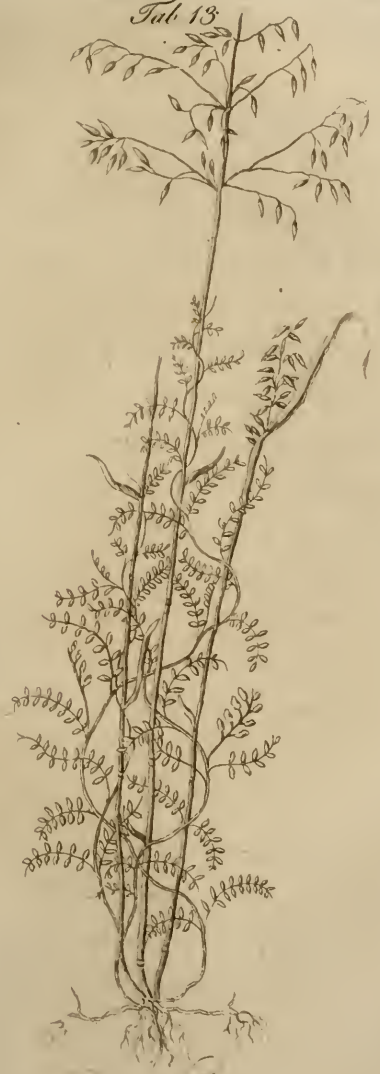
ſily propagated.—It ſeems to flouriſh upon the ſame ſoil with the former,—is equally well liked by cattle, and will probably afford a more nouriſhing hay, on account of the quantity of ſeeds it contains: But, as the ſtalks come up more thinly from the root, and branch more above, it would not ſeem of itſelf to be ſo well fitted for a paſture-graſs as the former. If it were intermixed with other plants that made the pile cloſe at the bottom, it might probably greatly encreaſe the value of the paſture; and would put it in the power of the farmer to cut a very fine crop of hay from his fields at any time that he might ſo incline.

It is often found growing among the corn in ſtiff ſoils badly dreſſed, where its roots are allowed to remain; and is known in ſome parts of Scotland by the name of *horſe-peaſe*.

But, of all the plants of this tribe that have occurred to me, none ſeem to equal the purple

p 430

Tab 13



Blue Tare

purple everlaſting, or buſh vetch, (*Vicia ſepium*), for paſture.

The roots of this plant ſpread on every ſide a little below the ſurface of the ground like both the former; from which ariſe many ſtems in the ſpring of the year, quite cloſe by one another. And, as theſe have a broad tufted top, covered with many leaves, it forms a pile, even without any other plant, as cloſe as could be deſired.—It does not grow to a very great height; and, as it ſprings up very quickly after being cut or cropt, it ſeems to be more properly adapted for paſturage than for hay; although it will grow to a ſufficient height for that purpoſe on a good ſoil. But, as the ſtalks grow ſo cloſe upon one another, there is great danger of having it rotted at the root, if the ſeaſon ſhould have a tendency to dampneſs.—It produces abundance of ſeeds, which could be ſaved with leſs difficulty than either of the former.—Clay ſeems to be the ſoil that it moſt affects.

The

The leaves of this plant are broader than either of the former ;—the flowers of a pale purple colour, ſpringing from the bottom of the leaves by pairs ;—the pods are firſt yellow, but black when ripe, and roundiſh almoſt like thoſe of common peaſe.—Theſe open very ſoon after they turn black, and ſhed the ſeeds,—which are freckled and flatted like the vetch,—or ſmall yellow lupine, but not ſo bright in colour.

I have been attentive to theſe plants of the pea-tribe, chiefly becauſe it has been often remarked, that no other claſs of plants afford ſuch nouriſhing food for quadrupeds as this does; from which it is probable, that they would yield an hay of a more nouriſhing quality than any that is produced from culmiferous plants. And, as it is always for the profit of the farmer to have as great a variety as poſſible of uſeful vegetables that he can cultivate, that he may thus have it in his power to rear thoſe only that are beſt

adapted

p.278 Tab. 1

Bush Vetch

adapted to his ſoil and other circumſtances, it is imagined, the few hints that have been given relating to theſe may be of ſome uſe ; eſpecially as there are no other plants commonly cultivated by the farmer that are like theſe ſo ſtrictly perennial, and which admit of being either cut or paſtured for any number of years that he may incline :—— Qualities that in ſome particular ſituations would render them highly valuable.

There are a great variety of plants of this claſs that I have had no opportunity of obſerving, that might probably be poſſeſſed of other qualities that might render them very beneficial to the farmer ; and, therefore, they demand the particular attention of the improver. Among theſe, the common garden everlaſting-pea, that is there cultivated as a flowering-plant, would probably yield a prodigious weight of hay upon an acre ;---as it grows to the height of ten or twelve feet,--- having very ſtrong ſtalks that could ſupport itſelf

itſelf without rotting, till it attained a very great height.---But I have never yet had an opportunity of trying it, or of knowing in what way it would admit of being cultivated.——To return to our paſture-graſſes.

The narrow-leaved plantain, or rib-graſs, is well liked by horſes and cattle, and yields a very good crop upon rich ground tending to dampneſs, if it is, at the ſame time, ſoft and ſpungy; but, upon any ſoil that has a tendency to bind, or upon dry ground, it furniſhes but a very ſcanty crop. But, as both this and white or Dutch clover have been long cultivated as paſture-graſſes, it is leſs neceſſary for me to recommend them to the public notice. They are both good paſture-graſſes.

The ſmall graſs leaved-plantain * deſerves the attention of the farmer as a valuable paſture-graſs. Like the milk-wort, it will thrive

* *Plantago tenuifolia.*

p. 434 Tab. 15

Narrow leaved Plantain or Rubgrass

Small Grass leaved Plantain

thrive upon barren ſoils, where hardly any other plant could live. It may be moſt eaſily diſtinguiſhed on poor clays, where it is frequently found, without the mixture of any other plant.—But it alſo abounds in many other paſture fields, where the graſſy like appearance of its leaves prevents it from being remarked. I have ſeen ſome downs (links) upon the ſea-ſhore, the ſoil of which conſiſted of a ſhelly ſand, that were covered with this plant entirely.

Its leaves are ſmall, and have much the appearance of ſome of the thickeſt and moſt ſucculent kinds of graſs.—Its flower-ſtalks are numerous,—about eight or nine inches long, and the ſpike of flowers and head uſually about three or four inches.—It produces abundance of ſeeds, which could be ſaved at little expence.

Cattle, horſes, and ſheep, eat the leaves greedily, eſpecially ſheep, which bite it very cloſe to the ground. On this account, the

ſeed-ſtalks are ſeldom ſeen but on the top of fail dikes, or on other corners, to which no kind of cattle have acceſs.—Even the ſtalks, while ſucculent, are cropped readily by cattle: But, when they are hardened, and the ſeeds begin to ripen, they appear very coarſe and diſagreeable to look at.

No plant bears the ſea air better;—and it grows well where it is ſometimes covered in ſalt-water.—It would therefore do well for ſalt-marſhes.

I ſhall only mention one other that has come within the ſphere of my obſervation, as deſerving to be cultivated by the farmer; viz. the common yarrow *, *Achillea millefolium*, or hundred-leaved-graſs, as it is ſometimes called.

Thoſe

* The farmers in Scotland will pleaſe to take notice, that this is not the plant known among them by the name of *Yarr*, Spurrey, (*Spergula*,) but another plant of very different qualities; as they will obſerve upon peruſing the text.

Yarrow.

Thoſe who may have formed an opinion of this plant from what they have remarked of it by way ſides, or other neglected corners where its flower-ſtalks have been allowed to advance, and its ſeeds to ripen, will probably be much ſurpriſed to hear *it* recommended as a valuable paſture-graſs, as they may very naturally imagine, that no animal ever taſtes it. For theſe flower-ſtalks are carefully avoided by every animal, while all the plants around them are eat to the ground.

But this plant is not ſingular in having its leaves reliſhed by many animals, and ſearched for with avidity, while its flower-ſtalks are rejected by them with diſguſt. For nature, probably with a view to preſerve the ſeeds of theſe plants from deſtruction, that were intended to clothe the fields with verdure, and furniſh abundant food for all the claſſes of *graminivorous* * animals, hath rendered

* Animals that feed upon plants.

dered moſt of their ſeed-ſtalks diſagreeable to the taſte of the greateſt part of them;—hence it happens, that the ſeed-ſtalks of almoſt all the graſſes, properly ſo called, are diſliked by almoſt every quadruped, while their leaves are reliſhed as the moſt grateful food that they can find †; and, therefore, thoſe kinds of graſs that run chiefly to ſeed-ſtalks are diſliked as a paſture. It is probable, that the ſeed-ſtalks of every plant of this claſs are equally diſagreeable, and would be equally avoided by them, were it not for the ſmall ſize of ſome of theſe, and the number of leaves with which they are enveloped; which, at the ſame time, prevents the animal from ſelecting them from the other parts of its food, and from feeling the diſagreeable

† Ought not this to afford a preſumption, that the hay that is made of the flower-ſtalks of *culmiferous* graſſes will not be ſo palatable or nouriſhing as that which is made from the leaves, or other parts of ſuch plants as admit of this?

diſagreeable flavour that they would be poſſeſſed of, if they were eat by themſelves.

But, if the plant of which we now treat is allowed to remain untouched till its ſeed-ſtalks are formed, theſe become ſo large, and are ſo eaſily ſeparated from all other plants, that every animal which feeds there can diſtinguiſh and avoid them with the greateſt facility; ſo that, while the leaves that ſpring out at the root are eat down cloſe to the ground, theſe are allowed to remain untouched till their ſeeds are perfected. And as, by their natural ſtrength, they are able to reſiſt the inclemencies of the weather, and remain ſtanding long afterwards upon the ſame ſpot, when they aſſume a very diſagreeable appearance, we have been induced, from theſe circumſtances, to think but very meanly of the whole plant.

This prejudice is ſtill farther augmented by another circumſtance, that rather ought, in the ſtrongeſt manner, to demonſtrate the

real

real value and excellence of this plant. For, as we never ſee one ſtalk of this graſs in our fineſt paſture-fields, we too haſtily imagine that *it*, in no caſe, contributes to the goodneſs of them. But the fact is directly the reverſe of what it appears. For, upon a cloſer inſpection, it will be found, that in almoſt every fine old paſture, a very great proportion of the growing vegetables with which it is covered, conſiſts of this very deſpiſed plant;—but the animals who feed there are ſo fond of it, as never to allow one ſtalk of it in theſe ſituations to come to ſeed; ſo that it there always conſiſts of leaves, which are confounded with the others of which the pile conſiſts, and conſtantly eat along with them. This, therefore, forms one of the beſt graſſes in our fineſt paſtures, and is more univerſally found in theſe than, perhaps, any other plant whatever; which is probably occaſioned by the extreme lightneſs of its chaffy ſeeds,

which

which are eaſily carried by the wind to a great diſtance, and are thus more univerſally eſtabliſhed than other graſſes whoſe ſeeds are more weighty, and, therefore, leſs eaſily diſſeminated. As the ſeeds could be eaſily collected, and come up very readily when they are ſowed, the farmer has it in his power thus to improve ſuch paſtures as he may incline at a very moderate expence.

One of the moſt perceptible diſtinctions that takes place between old rich paſtures, and ſuch as are newer, ſeems to be, that, in the former caſe, the pile of graſs is much cloſer than in the latter; which, in all probability, ariſes from a difference in the nature of the plants that abound in the one or the other. For, if this were not the caſe, we might eaſily make our new paſtures as cloſe as any old ones could poſſibly be, by ſowing a greater quantity of ſeed: But, ſhould we attempt thus to make the pile of a new laid down rye-graſs-field equally cloſe with that of

of an old paſture, the plants would be ſo much ſtinted in their growth by this unuſual degree of thickneſs, that we would loſe our crop entirely. The only method, therefore, that remains to be followed by us, if we wiſh to make our artificial paſtures to equal or exceed the fineſt natural ones in this reſpect, will be, to diſtinguiſh, with care, thoſe plants that have a natural tendency to grow cloſe upon one another, from thoſe that require to have greater room to ſpread themſelves; and to cultivate the former with care when we have once diſcovered them.—Thus, of the plants above enumerated, the ſheeps-feſcue, and creeping poa, or meadow-graſs, naturally grow with their leaves much cloſer upon one another than rye-graſs, or moſt of the others; and the purple-buſh-vetch has always, perhaps, ten times more plants ſpringing up in the ſame ſpace of ground than the blue-tare above mentioned.—Now, it never fails that the yarrow abounds very much

much in the very cloſeſt parts of the cloſeſt paſtures; and, therefore, it would ſeem, on this account, highly to merit the attention of the farmer, as it will give him an opportunity of thickening his paſture-fields much more quickly than it would otherwiſe do.—But this plant ſeems to be altogether unfit for hay; and, therefore, ought only to be ſowed where the field is intended for paſturage.

It ſeems to delight chiefly in dry ſoils; or rather in ſoils that are not wet:—For it arrives at its greateſt perfection in rich fields that are naturally fitted to produce a rich and ſucculent crop of graſs.—It grows alſo upon clays,—and is among the firſt plants that ſtrike root in any barren clay that has been lately dug from any conſiderable depth; ſo that this plant and thiſtles are uſually the firſt that appear on the banks of deep ditches formed in a clayey ſoil.

But, although it takes root upon clayey ſoils, and grows there more readily than moſt other plants, yet it delights more in a looſe, ſpungy, porous ſoil,—a kind of ſoil on which fewer plants are found to proſper well than almoſt any other. The ſoil that is peculiarly fit for clover, is by no means ſo favourable for this plant as that on which rye-graſs thrives in perfection.—But it will grow and thrive in a ſtill more ſpungy ſoil than rye-graſs can do. My experiments, however, have not yet been ſo numerous as to enable me to ſpeak farther here with the certainty I could wiſh.

All animals delight to eat it; but, from the dry aromatic taſte that it poſſeſſes, we would imagine that it would be peculiarly favourable to the conſtitution of ſheep. They are very fond of it, and eat it to the ground in all their paſtures.

Before I leave this article, juſtice requires me to acknowledge, that I owed the firſt thought of the uſefulneſs of this graſs to a hint

hint with regard to it thrown out by Dr Hill in ſome of his performances, which I found quoted in ſome book that I chanced to read.

There are no doubt many other plants that would greatly add to the value of our paſtures, were their qualities and the mode of cultivating them duly pointed out. The *Melampyrum*, or cow-wheat, in particular, has been ſaid to add greatly to the quality of the milk and flavour of the butter of the cows which feed upon it. But of this I have as yet had no experience.

I hope that this ſmall opening will encourage others to proceed in the ſame walk, and oblige the world with greater and more important diſcoveries.

XXXVI.

What is the moſt œconomical manner of conſuming the produce of any paſture-field? —That is to ſay—Whether ought the animals

mals who are to feed upon it to be turned upon it at large, and be allowed there to remain without any change of paſture for the whole ſeaſon; or ought they rather to be kept upon it only for a ſhort time, and then carried to another;—or in what other way ought they to be treated, ſo as to turn out to the greateſt profit of the poſſeſſor?

* * *

The practice that in general prevails throughout the greateſt part of Britain in rich incloſed paſtures, where domeſtic animals are intended to be fattened for the butcher is, to turn the whole number of beaſts that it is ſuppoſed the field could properly maintain into it in the beginning of ſummer, where they are allowed to go at their own eaſe all the remaining part of the ſeaſon, without any change of paſture at all. —And although many who have been accuſtomed to practiſe this method are very poſitive in their aſſertions, that it is the moſt

œcono-

œconomical mode of conſuming their paſtures that could be practiſed, yet, as I do not find that they ſupport this aſſertion with any deciſive experiments, there ſeems to be ſo many reaſons to make us doubt if the fact is as they aſſert, as to make us, at leaſt, ſuſpend our opinion till the neceſſary experiments ſhall be fairly made, ſo as to aſcertain this point with preciſion.

For, as the greateſt part of the common graſſes grow more quickly during the beginning of ſummer than they do after the ſeaſon is farther advanced; if we were to attempt to put nearly as many beaſts into the field as would be ſufficient to eat up all the graſs that advances at that period, they would not have half food during the remaining part of the ſeaſon. To avoid this inconvenience, therefore, it becomes neceſſary to put only as many beaſts at that time into the field as can be afterwards maintained in it properly, ſo that many plants muſt then be ſuffered to run to ſeed; after which

no animal will taſte them, unleſs conſtrained by hunger.—Many more are, at this period, trod down by the feet of the beaſts in their wanton gambols, which are never afterwards much reliſhed by them.—And, as it has been already demonſtrated, p. 38. Vol. II. that many plants ſoon attain to a certain length, beyond which they never advance, if not eat down or cropped; the whole vegetation of the field muſt thus be ſtopped, and the total produce of it throughout the whole ſeaſon be greatly diminiſhed from what it might perhaps have been by a more ſkilful management. And

If, with a view to remedy, in ſome meaſure, this inconvenience, a greater number of beaſts ſhould be put into the field during the beginning of ſummer than towards the end of it, we would indeed, in ſome meaſure, diminiſh the evil, but not effect a radical cure.—For if the field were at that ſeaſon eat ſo bare as to prevent any of the plants from

from running to ſeed, there would be ſome room to dread that the animals would be too much ſtinted for food to fatten kindly. —And as the graſs upon which they have lately breathed is, in general, diſagreeable to them, it is much to be doubted if they would come ſo quickly into fleſh as would abundantly reward the hopes of the huſbandman.

From theſe conſiderations, it would ſeem probable, that there muſt always be a conſiderable waſte of food by this mode of management, let the farmer be as attentive as poſſible; which, it is imagined, might in a great meaſure be prevented by the following, or ſome ſimilar practice.

As every kind of animal delights moſt to feed upon freſh plants that have newly ſprung up from a bare ſurface, in which there is no decayed or rotted ſtalks of any kind; there can be little doubt but that, if cattle that are intended to be fatted were al-

ways

ways ſupplied with a conſtant ſucceſſion of this kind of food, they would be brought forward in fleſh as quickly as the nature of that food could in any caſe do it.

To obtain this conſtant ſupply of freſh graſs, let us ſuppoſe that a farmer who has any extent of paſture ground, ſhould have it divided into fifteen or twenty diviſions, nearly of equal value; and that, inſtead of allowing his beaſts to roam indiſcriminately through the whole at once, he collects the whole number of beaſts that he intends to feed into one flock, and turns them all at once into one of theſe diviſions; which, being quite freſh, and of a ſufficient length for a full bite, would pleaſe their palate ſo much as to induce them to eat of it greedily, and fill their bellies before they thought of roaming about, and thus deſtroying it with their feet. And if the number of beaſts were ſo great as to conſume the beſt part of the graſs of one of theſe incloſures

in

in one day, they might be allowed to remain there no longer;—giving them a freſh park every morning, ſo as that the ſame delicious repaſt might be again repeated. And if there were juſt ſo many parks as there required days to make the graſs of theſe fields advance to a proper length after being eat bare down, the firſt field would be ready to receive them by the time they had gone over all the others; ſo that they might be thus carried round in a conſtant rotation.

But, as it would be neceſſary to allow his fattening beaſts always to have a full bite, it would not be proper to keep ſo many of theſe as would at any time eat any of theſe fields quite bare.—And as the graſs that they would thus leave behind them would, in part, run to ſeed before they could return to the field, while ſome other parts of it would be withered, or half rotted, the paſtures would be thus rendered leſs ſweet

and nouriſhing than they would otherwiſe have been—And as there would likewiſe be a ſmaller quantity of graſs produced on the field in this way than if it had been eat quite bare to the ground, it would be great want of œconomy in the farmer not to keep another ſet of young or lean beaſts which ſhould regularly ſucceed the firſt, and eat up all that they had left, ſo as to make it quite bare, and put it in a proper condition for vegetating again with vigour. And as it would be always in his power to augment or diminiſh this laſt ſtock, as circumſtances might require, by keeping a few ſupernumeraries in ſome ſpare field, or by buying in others; it would ſeem that he would thus have a probability of reaping the full benefit of every blade of graſs that could be reared upon the field;—more eſpecially if the circumſtances mentioned in the following diſquiſition were duly attended to.

There

There is no doubt, however, that cattle, when allowed to roam at large on an extenſive field, will fatten very kindly if they have a ſufficient quantity of food: But the queſtion at preſent is, Whether the ſame field will feed to perfection a greater number of beaſts in the one or the other mode of managing it? The ſubject is of importance, and deſerves to be elucidated by *proper* deciſive experiments.

XXXVII.

Can the produce of a farm be in general conſumed with as much profit by only one ſpecies of domeſtic animals, as by a greater variety of theſe?—If the laſt ſhall be the caſe,—Which of the animals commonly propagated by the farmer in this country, could be moſt oeconomically reared upon the ſame farm with others?—And, in that caſe,—

What

What would be the moſt proper method of feeding them?—That is to ſay,—Whether ought they to be allowed to paſture on the ſame field at one time, or to ſucceed one another upon it?—If ſo,—In what order ought they to follow one another?

* * *

As it is certain that one claſs of animals on many occaſions delights to feed upon plants that are totally diſregarded by, or even noxious to others, it would ſeem that, unleſs a man had his farm in ſuch order as that no one plant would grow upon it that he did not cultivate, it might ſo happen that, among the variety of plants that ſpontaneouſly ſpring up upon it, there would be ſome that would be improper for any one claſs of animals;—all of which would be totally loſt, if he ſhould confine himſelf to that ſingle ſpecies. But,

as

as few farms are in the order here ſuppoſed, it ſeems highly probable, that it would be always an advantage for the farmer to keep more claſſes of animals than one upon his farm. And, conſidering it merely in this view, the greater variety he could keep, the leſs waſte he would ſuſtain.—But other oeconomical conſiderations may frequently make it proper for him to ſubmit to this loſs, inſtead of perhaps a greater that he might ſuſtain by too cloſely adhering to it.

The rural oeconomiſt reaps another advantage by allowing different claſſes of animals to paſture the ſame field. For, even upon ſuppoſing that the whole of the plants produced upon it ſhould be wholeſome and agreeable to one claſs; yet, as no animal will eat the graſs that ſprings up where one of its own ſpecies has dunged, till it has got a winter's froſt, although the graſs produced by this means is greedily eat by another claſs of animals; if no more than one ſpecies is ever

ver admitted into any field, the waſte that is ſuſtained by that means muſt be very conſiderable; which would have been totally ſaved by a more prudent management.

On another account, likewiſe, we would expect, that the farmer would derive ſome advantage by keeping different claſſes of animals rather than one ſpecies. For, as ſome of theſe naturally prefer the flowers and ſtalks of plants, which others reject and only eat the leaves; while other kinds are ſtill more fond of the roots:—And, as ſome kinds bite much cloſer to the ground than others do, it would ſeem that, by having different claſſes upon the ſame field, much would be ſaved that muſt otherwiſe have been loſt.

The Dutch, who are in all caſes attentive to oeconomy, have long perceived the benefit that may be reaped from a due attention to this circumſtance, and have turned it to their advantage; ſo that it has become a common obſervation among them, that, when

eight

eight cows have been in a paſture, and can no longer get any nouriſhment from it, two horſes will uſually ſubſiſt in it very well for ſome days; and, when nothing is left for the horſes, four ſheep will live comfortably upon it for ſome time longer. In which caſe it is plain, that, if nothing but cows had been kept upon the paſture, all that was conſumed by the horſes and ſheep would have been loſt.

I imagine that all kinds of animals uſually feed moſt quietly when they are not mixed with others; and, therefore, it is probable, that it would uſually be moſt adviſable to keep the different claſſes ſeparate, as in the Dutch experiment. But, whether the order they preſcribe is the beſt or not, I cannot pretend to ſay. As goats love the flowers and ſtalks, it is probable, that they ſhould be firſt put into the field.—Theſe might be followed by cattle, who love to get a full bite, and cannot eat cloſe to the ground.——Horſes, as delight-

delighting in ſhorter paſture, would probably ſucceed them with advantage; and ſheep that delight in the crowns of roots, and that part of the graſs that grows neareſt the ground, ought, in all caſes, to come laſt.

XXXXVIII.

Are there not many uſeful animals known in different parts of the globe, that might be oeconomically reared in this country, and tend much to promote the progreſs of many uſeful arts, if they were introduced?—If this is ſo,—What are the animals that promiſe to be of the greateſt utility; and the particular purpoſes that each of them might be ſuppoſed moſt effectually to ſerve?

For

For the reaſons alledged in the foregoing diſquiſition, it is plain, that the greater the variety of uſeful animals is among which the farmer may be at liberty to chooſe, the greater chance he will have to get every product of his farm conſumed to the utmoſt advantage. For, as different claſſes of animals require food of different kinds, he will thus have a chance of getting every uſeleſs vegetable conſumed with profit.

Hitherto, the attention of the farmer has almoſt never extended farther than to the five domeſtic animals ſo often mentioned in this Eſſay; horſes, cattle, ſheep, goats, and hogs; ſo that even ſome animals that are natives of this iſland, have been totally neglected, or conſidered in ſome meaſure as wild; and, therefore, beyond the ſphere of

the farmer's attention. Of this ſort is the rabbit; which it is poſſible might on many occaſions be kept as a tame animal with great profit; as it eats almoſt every green thing, and could probably be nouriſhed upon plants that are rejected by all our other domeſtic animals. And its fur, if the rabbit is of the beſt ſort, is of ſuch value as always to be ſure of coming to a ready market.

But, not to dwell on what may by many be deemed ſuch an unimportant object,—we may obſerve, that there ſeems to be no reaſon in the nature of things to make us ſuſpect, that the goat of Angora, which furniſhes the fine Mo-hair that conſtitutes ſuch a conſiderable branch of our Levant-trade, might not thrive in Britain as well as in its native country. For, although we do get this wool from ports that are ſituated in a warm climate; yet the animal itſelf lives upon the rocky mountains of Pontus, where it experiences a very conſiderable degree of cold:

And

And it might probably be bettered, rather than rendered worſe, by being introduced into Britain.

The ſame arguments might be adduced to ſhow, that the goat of Thibet, that carries the ſtill finer fleece, known by the name of Touz, which is eſteemed at three times the price of the famous Perſian wool, might be here reared with profit; as the country that it inhabits is undoubtedly much colder in winter than any part of Britain.—Neither is there any certainty that the goat of Golconda, which yields the bezoar as well as a very fine wool, might not admit of being kept with profit in Britain; as it has never yet, that I have heard of, been fairly tried. But there can be no doubt but that the Chamois goat of the Alps would thrive well on the high mountains of Wales and Scotland, where hardly any other animal at preſent feeds: And the Bouquetin of the ſame country, which delights to live chiefly among the

the ice upon the tops of the higheſt Alps, and is in many reſpects an uſeful animal, would conſume thoſe plants that grow where none of our own animals at preſent dare venture.

The ſheep of Perſia and Spain are known to produce wool of a much finer quality than is found in any other part of the globe; which we have hitherto been diſpoſed rather to attribute to the influence of their particular climate and paſture, than to any eſſential difference in the original breed of theſe animals reared in theſe countries; and, therefore, we have been diſpoſed to look upon every attempt that may have been made to introduce theſe into our own country, as wild and chimerical; ſo as to ſit down contented with our own ſituation, and allow the inhabitants of theſe countries to enjoy the benefits of their good fortune without moleſtation:—Yet the author hereof flatters himſelf with the hope, that, if the reader has

has attended to ſeveral obſervations that have occurred in different parts of this Eſſay, he will be diſpoſed to think, that there appears not any reaſon againſt it ſo ſtrong as to debar us from all hope of ſeeing ſuch an attempt, if wiſely conducted, attended with ſucceſs.

The Lama, Guanacoe, and Paco of America, are varieties of a claſs of animals of the camel-tribe, which ſubſiſt upon little food, and probably delight to eat ſuch plants as are either uſeleſs or noxious to all our domeſtic animals. Some of theſe have ſo much bodily ſtrength as to be employed by the natives of Peru as beaſts of burden, and they all afford a kind of wool of a peculiar quality that might be employed with ſucceſs in many of our manufactures, and help to give them ſuch peculiarities as might entitle them to a preference to thoſe of other nations in foreign markets, were we ſo wiſe as to adopt them.

them. And, although they be natives of a tropical region, it has been already ſhowed, that there is reaſon to think they might be able to endure the cold of our climate without any apprehenſion of their being hurt by it; ſeeing they conſtantly chuſe to frequent the ſnowy mountains that abound in their native country.

Neither are we as yet ſufficiently acquainted with the nature and diſtinguiſhing qualities of the Urus, Biſon, and Bufaloe; varieties of the cattle (Bos) tribe. In Italy, and other warm countries, the Bufaloe is employed as a beaſt of burden, and is ſuppoſed to be equal in ſtrength to three or four horſes. They yield a conſiderable quantity of milk, of which good cheeſes are made; and, altho' their fleſh is not ſo much valued as our beef, yet the hide is deemed in many reſpects preferable to that of our ordinary cattle. In Hindoſtan, and other parts of the Eaſt Indies, they have another variety

of

of theſe that are ſtill more tractable than either the Bufaloe in Italy, or the ox in other parts of Europe, which are therefore employed as almoſt the only beaſt of burden in all theſe countries.—The Biſon is reckoned ſtill more docile and tractable than theſe, and is employed in ſome countries for the purpoſes of war; and, what is more ſurpriſing ſtill, as a guard and attendant of their flocks in the ſame manner as our dogs. The Urus is a native of temperate climates, and although of an enormous ſize, is gentle, and eaſily tamed; but it is utterly unknown in Britain. In Louiſiana, there is a variety of this claſs of animals that is covered with a very fine and cloſe fur, that more reſembles wool than hair, which is employed by the natives for the ſame uſes as wool. Theſe animals are there wild, but might eaſily be tamed. But, whether that fleece would admit of being annually ſhorn like that of ſheep, or what would be its particular value in manufactures,

factures,—or whether the animal would be poſſeſſed of any other valuable qualities, we are as yet at a loſs to know. Its fleſh is eſteemed by thoſe who have eat of it;—and its ſkin, dreſſed with the wool, forms ſuch a warm and uſeful covering for the Indians and Canadians, that they have hitherto kept them entirely for their own uſe; none of them that I have heard of having been hitherto exported.

In North America, they have likewiſe a ſpecies of deer, called by the natives *Orignial* or *Aurignial*, which ſeems to be poſſeſſed of ſome qualities that might, perhaps, by the induſtry of man, be employed for his advantage. It conſiderably exceeds in height the talleſt horſe;—hath legs very long in proportion to its body;—runs with great ſwiftneſs; and, like all that claſs of animals, is endued with very great muſcular ſtrength; and may be eaſily tamed, ſo as to become as gentle as a lamb. This account I had from a gen-

a gentleman who had frequently ſeen one of theſe in the poſſeſſion of General Carleton, when Governor of Canada, that was tethered every day upon its paſture like a cow, and was equally tame.—This is probably the ſame animal that has been denominated by the Engliſh mooſe-deer, of the exiſtence of which ſo many have doubted. —In its wild ſtate, it lives in winter chiefly upon moſs and branches of trees, in this reſpect reſembling the Rhen-deer of Lapland. But, whether it could be brought at that time to feed upon any of the kinds of moſs that ſo often cover our paſtures,—or whether the Rhen-deer is really incapable of being kept in any climate more temperate than Lapland, which has been often aſſerted with a great degree of confidence *;—or

* However poſitively this may have been frequently aſſerted, there ſeems to be much room to doubt if the fact be really ſo, as there is found in all the

whether any other variety of this claſs of animals, or any other creature that could be uſeful to man, could be fed on any of theſe ſorts

the provinces of North America, even as far ſouth as the back ſettlements of Virginia, an animal of the deer-kind, called by the natives *Caribou*, which is acknowledged to be in all reſpects the ſame with the Lapland Rhen-deer. And what reaſon have we to imagine, that an animal which can bear the intenſe ſummer-heats of Lapland, would not live in a more temperate climate, where thoſe kinds of moſs on which it chiefly delights to feed can be found?

Of all the animals that roam through the woods of North America, none are more wild than the *Caribou*, nor have the natives ever once thought that it would be poſſible to tame it, or render it ſerviceable to man as a domeſtic animal; although the experience of the poor Laplanders ſufficiently ſhows that it may be rendered tame and gentle, and furniſh alone almoſt all the neceſſaries of life to a frugal and abſtemious people. From which example we ought to be taught never to deſpair of being able to domeſticate almoſt any graminivorous animal, however wild, if it can be of any eſſential ſervice to ourſelves.

ſorts of moſs that ſo much abound in all our old paſtures, and are entirely uſeleſs for every œconomical purpoſe that we know of, is not at all aſcertained; although it is a ſubject highly deſerving the attention of the public.

Many other animals have been ſlightly mentioned by hiſtorians as poſſeſſing particular valuable qualities, but with ſo little accuracy as not to admit of our relying on their accounts as certain. Of this claſs is the *Anta* of Peru, an animal of the bufaloe-tribe, but of an uncommon kind, particularly eſteemed there for the remarkable ſtrength and thickneſs of its ſkin. The *Tapariſſou*, an animal of Brazil, ſaid in ſome reſpects to reſemble an ox and an aſs,—remarkable likewiſe for the extraordinary ſtrength of its ſkin.—Others aſſert, that in Brazil they rear a kind of animal reſembling a ſheep, as large as a horſe, with long horns and a ſhort tail, &c. &c.—But whether ſuch animals

mals as these do really exist or not, is very uncertain; and, if they do, it is as doubtful if they could be of any use to us. But surely such objects deserve the attention of philosophical enquirers. The existence of the animal called *Nil-Ghau*, so lately seen in Britain, and so well described by Dr Hunter, was deemed, at least, as great an uncertainty as any of these.

XXXIX.

We in Great Britain are as yet so little acquainted with the nature of the mule, and, at the same time, have so many imperfect accounts of the amazing strength and hardiness of that singular animal, as makes it much to be desired that an authentic account of it could be procured for the benefit of the farmer, that so he might know how far it might be prudent in him to make use

of

of this in preference to every other beaſt of burden.

* * *

This animal is ſaid to be poſſeſſed of much greater ſtrength, in proportion to its ſize, than either the horſe or the aſs;—is longer lived than either of them, and can be ſupported on much poorer fare;—is hurt by no ſort of bad treatment;—patient under hardſhips, with a long etc. of qualities, that thoſe who are unacquainted with it have difficulty to bring themſelves to admit of, and yet know not how to reject, the evidence with which they are ſupported being ſometimes ſo very ſtrong.

One would imagine, that, if all theſe extraordinary advantages reſult from this kind of unnatural croſſing the breeds of animals, that thoſe who have experienced it in this inſtance would have endeavoured to try what

what would have been the reſult of a ſimilar croſſing with regard to other animals that nearly reſemble one another;—ſuch as the cow with the urus, biſon, or bufaloe—the deer with the cow or goat, &c. &c.—But I have met with no account of any uncommon ſpecies of animal of the mule kind, excepting one that carries in its face ſo much the appearance of a fable, that I ſhall give the account of it in the very words of the author who relates it, Jean St Leger, in his account of Switzerland:—'Among * the 'domeſtic animals, ſays he, there is only the '*Jumarre*, that is altogether unknown in 'the northern countries. This animal is 'procreated either between a bull and a 'mare, or between a bull and a ſhe aſs. The 'firſt are the largeſt, and are called *baf*; 'the

* *Entre les domeſtiques, il n'y a que les* jumarres, *&c. Hiſt. Gener. des Egliſes Vaudoiſes, par Jean St Leger, paſteur.* F. p. 8.

'—the latter are ſmaller, and are called
'*bif.*——

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'———They have the head and the tail of
'an ox, with a ſmall excreſcence in place of
'the horns; the reſt of the body reſembles
'that of the horſe or aſs. Their ſtrength
'is inconceivable with regard to their ſize.
'They are ſmaller than mules,—eat little,
'and are ſurpriſingly expeditious on a jour-
'ney (*devorent le chemin*). I have travelled
'eighteen leagues, altogether on mountain-
'ous roads, on the 30th of September on a
'jumarre, but with a good deal more eaſe
'than I could have done it on horſe-back.'

To deny a fact ſo poſitively aſſerted by a man of character, unleſs we had direct proofs of the contrary, would be rather bold. —At the ſame time, I muſt acknowledge, that the difference of the mode of copulating is ſo great between cattle and horſes, or aſſes, that it is hardly poſſible to avoid read-

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ing this account with ſome degree of ſcepticiſm. Mention is made of this ſame jumarre, which is called *gimarro* in Italy by other authors. But, as many of our nobility and gentry have occaſion to paſs through Switzerland in their way to Italy, it would be eaſy for them, if they choſe it, to get ſatisfaction as to this fact upon the ſpot.——

XL *.

Some plants grow only on a hard firm ſoil, and others thrive only in an open ſpungy mold.—Required—A liſt of each of theſe two oppoſite claſſes of plants, as alſo a ſpecification of ſuch plants as *approach* to either of theſe extremes?

It has been often diſputed by practical farmers, whether rolling ground was an advantageous practice, or the reverſe.—Pro-

be

* This article, and the two following, ought to have been inſerted after VIII. p. 57. but they were accidentally omitted in that place.

bably this may, in ſome caſes, depend on the nature of the ſoil,—and in others it may be influenced by the peculiar œconomy of the plants that grow upon it.

The broad-leaved plantain * requires a ſoil of ſuch an unuſual degree of compactneſs, as ſeems hardly to be ever met with naturally;—on which account this plant is almoſt never ſeen but upon road-ſides, or other places where the ground has been artificially compreſſed by ſome weighty body paſſing frequently along its ſurface †; hence it has obtained the vulgar name of the *wayfaring* (corruptly wavering) leaf. If this were an uſeful plant, it could not be propagated without the help of frequent rolling.

* *Plantago major.*

† I have been aſſured by a reſpectable perſon, that this plant is often met with in the common fields in ſome parts of the county of Durham. If ſo, the ſoil muſt be very uncommon, and deſerves to be accurately deſcribed. I never found it in the common fields in any place where I have been.

The common knot-graſs * poſſeſſes the ſame quality in ſome meaſure, although not in ſuch an eminent degree as the former, as it is moſt frequently found on places that have been much trod upon, and afterwards allowed to be undiſturbed for ſome time; but it is alſo ſometimes met with in other places.

The ſame may be ſaid of the annual meadow-graſs †, which is the laſt plant that diſappears on road-ſides, except the two above named; but it is alſo found in ſituations where the ground is not near ſo much compreſſed.

Many other plants that grow naturally upon ſuch ſoils as have an unuſual degree of firm compactneſs, can only be made to grow on more ſpungy fields by frequent rolling, or preſſure of ſome ſort, which gives them artificially that firmneſs of texture they had not naturally.

Perennial red clover ‡ is a plant of this ſort. It proſpers abundantly in firm, and what

* *Polygonum aviculare.* † *Poa annua.* ‡ *Trifolium pratenſe.*

what might almoſt be called obdurate ſoils; —but, in others of a looſer texture, it is to be found only in the foot-paths that may accidentally be made through the fields. I have ſeen a foot-path of this ſort ſtored with this plant for many thouſand yards in length, while not a ſingle ſtalk of it could be found in the fields on either ſide.

The common white, or Dutch clover *, delights alſo in a firm ſoil, although it does not require ſuch a degree of compactneſs as the former; and, therefore, proſpers in many fields without any artificial preſſure; but, on very ſpungy ſoils, art muſt ſupply the deficiency of nature, or it will not thrive. —Hence it happens, that, on ſoils of this ſort, white clover is frequently ſeen to flouriſh exceedingly on ſuch foot-paths as are moderately trod upon, while it only languiſhes, or hardly appears in other parts of the field.

On

* *Trifolium repens.*

On the contrary, the ſmall-leaved ſorrel * requires a ſoil of an exceeding open and ſpungy texture, upon which alone it can be made to grow,—and is totally deſtroyed by any kind of weighty continued preſſure upon it; of which I had once an opportunity of being fully ſatisfied, by an experiment that deſerves to be recorded.

I had occaſion to lay down a ſmall ſpot of ground of this open ſpungy ſort into graſs by way of *lawn*. It was ſowed with white clover ſeeds;—but, in ſome of the ſpungieſt, or, as the practical farmer would call it, *deafeſt* places, this ſmall-leaved ſorrel came up in ſuch abundance, as to choak the clover, ſo that hardly a ſingle plant of it could be ſeen.

Vexed at this diſappointment, I was extremely anxious to get this uſeleſs and unſightly plant eradicated:—But, being at that

* *Rumex Acetoſella.*

that time little acquainted with the nature of it myſelf, having come from a part of the country where it was hardly known,—I enquired at thoſe who had been accuſtomed with it from their infancy how it might beſt be deſtroyed—but in vain.

A very little attention, however, made me ſoon obſerve, that this plant was never found but on ſoils that were exceeding ſpungy and open; and, therefore, it ſeemed probable, that, if theſe ſoils were rendered firm by preſſure, it might be thus deſtroyed.

And as rolling ſeemed to be the eaſieſt method of effecting this, I reſolved to try if it could be killed by this means.

With this view, a weighty ſtone roller was brought to that part of the green where the ſorrel abounded moſt, which was drawn along it for twenty or thirty yards, and puſhed back again to its former place regularly every morning,—keeping always exactly in the ſame tract.

In

In a few weeks the ſorrel totally diſappeared; and the little alley, formed by the roller in its courſe, became covered with a cloſe pile of white clover; although the ground on each ſide of it ſtill abounded with the ſorrel, and hardly a ſtalk of clover appeared among it.

Old paſture-fields, in our northern climate, are frequently over-run with fog, conſiſting of various kinds of moſſes, which proſper abundantly during the winter-ſeaſon. I never yet obſerved any fog in the foot-paths thro' the fields that were moſt infeſted with it. This would ſeem to indicate, that frequent preſſure might be an effectual mean of eradicating it. Every circumſtance that I have yet obſerved relating to the growth of this ſpecies of plants, ſeems to indicate that they proſper beſt on a ſpungy open ſoil.

Spurrey *,—or, as it is ſometimes called, *Yarr*,—is only found in the ſame ſort of ſpungy

* *Spergula.*

ſpungy ſoils.—It is an annual plant, that is exceedingly pernicious to the crops of corn in thoſe countries where this kind of ground abounds. In firmer ſoils, the charlock †, and wild muſtard ‡, become the ſcourge of ſlovenly farmers in its ſtead.

When this ſpungy deaf ſoil is in a different ſtate of cultivation, it naturally produces the common dead (vulgo dea) nettle. This eſpecially abounds where a ſoil of this ſort is trenched up, and the mold that has been long buried deep is expoſed to the air.

The cocks tail, or feather graſs ‡, alſo requires an open and ſpungy mold, and cannot be made to thrive in any other.—Hence it happens that, in countries where this ſoil abounds, all the *manured* fields become naturally covered with this kind of graſs when they are left to themſelves: For, as the ſeeds are

† *Rhaphanus raphaniſtrum.* † *Sinapis arvenſis.*
‡ *Stipa pennata.*

are light, they are carried by the wind to a great diſtance, ſo that there is never want of ſeeds in abundance to ſtock all the fields.—And, where this graſs proſpers, it roots out all other ſorts.

Rye-graſs * will indeed make a ſtruggle with it. And, when the ground is properly cleaned,—and a little conſolidated by a good mode of culture,—if rye-graſs ſeeds are then ſowed in abundance, it will uſually get the better of the former.

This ſpecies of graſs, which is now ſo univerſally cultivated in moſt parts of Britain, requires a deep, open, looſe, deafiſh ſoil, tending to dampneſs, to bring it to full perfection. Wherever the cocks tail graſs naturally abounds, ſkilful culture will make the rye-graſs flouriſh exceedingly. Nor do thoſe who have not ſeen a ſoil of the nature here treated of, know to what an amazing degree of

* *Lolium perenne.*

p. 328. Tab. 18.

T. Adel. Cocks tail or Feather Grass AB 1c

of luxuriance this plant may be reared. I know well that people who live in countries that enjoy a much better ſoil in general than that which has been familiar to me for ſome time paſt, would be little diſpoſed to give me credit, ſhould I aſſure them, that, on a ſoil of this ſort, I have meaſured ſeveral ſtalks of rye-graſs above ſix feet in length.—Yet this is a truth that could be atteſted by ſeveral reſpectable perſons who ſaw, and meaſured theſe ſtalks, ſhould it be thought worth enquiring into *.

I forbear to mention the weight of hay I have cut from an acre of this ſort of ground at one cutting, as I am ſenſible it would appear incredible.

* It is neceſſary to remark, that no kind of culture could bring rye-graſs to this amazing length, unleſs the ſeaſon was remarkably dry;—for, when the ſoil is rich, and the ſeaſon damp, ſuch a luxuriant crop would be rotted long before it could have attained any thing like maturity.

Yet, on this ſoil, no culture that I have yet ſeen tried can produce an abundant crop of red clover; which requires a weightier, firmer, or ſharper ſoil.

The cocks tail graſs, as has been ſaid, only appears in fields that have been *manured*.—In other fields, conſiſting of the ſame kind of ſoil, the ſmall bent graſs * as naturally and univerſally eſtabliſhes itſelf.

The ſubject treated of in this diſquiſition has been ſo little attended to, and ſo few practical farmers have had an opportunity of being intimately acquainted with ſoils differing ſo much from one another, as thoſe that have furniſhed matter for theſe obſervations, that I am afraid I ſhall hardly here be perfectly underſtood. It is, however, extremely important, and deſerves to be farther elucidated.

Allow me here to draw one uſeful corollary, that naturally ariſes from the conſideration

* *Agroſtis capillaris.*

ration of this ſubject, which I would beg to recommend to the attention of young and ſanguine improvers in agriculture, as it might tend to inſpire a little of that rational diffidence, the want of which has proved the ruin of thouſands who have ſet out in that career.

If large and extenſive diſtricts are to be found,—in which the ſoil, through almoſt every part of the one, differs very much from that in the other, as to the above mentioned particulars, although they may perhaps agree very much in their general appearance, and the proportion of ſand and clay, and the other diſtinguiſhing particulars of ſoils uſually taken notice of by writers on agriculture, or others, it muſt follow, that the man who is well acquainted with the beſt mode of culture for the one of theſe countries may be altogether unacquainted with the beſt method of treating a field that he might

might think was very much of the ſame nature with his own, in another diſtrict.

Hence it follows, that the travelling farmer ought to be cautious how he condemns ſome particular practices he may obſerve, that may to him appear extremely unreaſonable, as circumſtances may ſometimes render one practice very proper,—which, upon a ſoil of another ſort, would be attended with the moſt baneful conſequences.

Hence, likewiſe, it follows, that the young improver ought to be extremely cautious how he adopts the advice of ſuch farmers as may have been bred on a diſtrict, at a great diſtance from his own, as he may ruin himſelf in purſuing a practice in the one caſe, that might be highly advantageous in the other. The hints of ſenſible men in his neighbourhood ought to be liſtened to with attention; but an obſerving eye, and an unremitting attention to ſuch facts as may occur to one's ſelf, are the only ſure guides. Till experience has

has accumulated wiſdom, ſafety conſiſts in cautious circumſpection alone.

If I ſpeak here with a more than ordinary degree of ſollicitude, it ariſes entirely from a full conviction of the miſchievous conſequences that often reſult from an oppoſite conduct, and a warm deſire to avert from others ſuch calamities as I have in many inſtances ſeen ariſe from it. My own extenſive experience in two very diſtant and diſſimilar parts of the country *, enables me to ſpeak with the greater certainty on this head.

As few who have always remained in one corner of the country can have had an opportunity of perceiving the influence of particulars of this ſort in their full force, I ſhall beg leave to mention an anecdote relating to it that occurred to myſelf.

Some

* The writer was born near Edinburgh, in Mid-Lothian, and practiſed agriculture there for ſeveral years before he removed to Aberdeenſhire.

Some years after I had been in Aberdeenſhire, two very ſenſible farmers from the Lothians came to viſit me in one ſeaſon, ſeparately.—It happened that I was fallowing a field that year of a ſoil of an exceeding bad quality, which, in its external appearance, greatly reſembled ſome of the beſt fields that theſe gentlemen had been accuſtomed to ſee ; and both of them, ſeparately, after walking over my farm, and examining the different fields with attention, pitched upon this as the very beſt field in my farm,—although it was in fact by far the worſt they had ſeen.

One of theſe gentlemen had practiſed farming in his native place, with the greateſt ſucceſs, for upwards of fifty years ;—and the other, for more than forty.—They were both men much eſteemed for their knowledge and diſcretion ; nor was there one in the country where they lived that could have

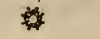
have formed a juſter judgment of the value of any ſoil there than they could have done.

A deciſion nearly ſimilar to this was given afterwards by a very ingenious and ſucceſsful farmer in Northumberland. The truth is, neither of them had ever ſeen a ſoil of the nature of that in queſtion; and it was no impeachment on their judgment, if they were unacquainted with its real qualities, and therefore reaſoned from analogy, that it would approach nearer to the nature of thoſe ſoils that it moſt nearly reſembled.

XLI.

Some plants can be reared only upon ſoils that have been manured with one kind of manure, and the growth of others is chiefly promoted by other manures.—Wanted—A liſt of ſuch plants as have their growth

growth chiefly promoted by any one ſort of manure, in preference to another.



Experience ſhows, that the common pea, whether white or grey, cannot be reared to perfection in any field which has not been either naturally or artificially impregnated with ſome *calcareous* * matter.—Hence it happens, that peaſe are rarely cultivated univerſally as a field crop, unleſs in thoſe parts of the country where either lime, or marle, or chalk abound. But, on the ſea-coaſt, where ſhell-fiſh are often catched in abundance, we meet with a few exceptions to this general rule.

It is pretty remarkable, that a ſoil which could hardly have made one pea come to perfection,

* Calcareous is a general term, including all thoſe ſubſtances that might be converted into lime, if unmixed with any other extraneous matter.

perfection, although richly manured with dung *,—if it ſhall have been once limed, ſhall be capable of producing abundant crops of peaſe ever afterwards, if duly prepared in other reſpects.

Turnip, on the other hand, will grow in any ſoil, if it is manured with dung ;—but time does not promote its growth in ſuch a high degree.—Hence turnips are the firſt improving crop in a country deſtitute of lime,—and peaſe in the other.

In countries where coal-ſoot is uſed as a manure in large quantities, the opinion prevails that this manure deſtroys clover, while it greatly encourages the growth of rye-graſs. But I have had an opportunity of remarking, that this opinion is erroneous ; although it is eaſy to account for the way in

* In theſe caſes the pea ſeems to haulm, and uſually dies away after bloſſoming, without ripening the grain.

which it has come to be ſo univerſally adopted.

For ſoot, although it does not deſtroy clover, does not in any ſenſible degree promote the growth of that plant, when applied to the ground in any proportions. I have uſed ſoot as a top dreſſing for clover and rye-graſs in all proportions, from one hundred buſhels per acre, to ſix hundred * ;—and I cannot ſay that ever I could perceive the clover upon theſe fields in the leaſt degree more luxuriant than in the places where no ſoot had been applied.

But the effects of this manure upon the growth of rye-graſs is amazing,—and encreaſes in proportion to the quantity, as far as my trials have gone.—Hence it happens, that, in fields dreſſed with ſoot, the rye-graſs ſo far overtops the clover, that it is not

* The buſhel is not a common meaſure in Scotland: It is nearly the ſame with the peaſe, or meal firlot.

not ſeen,—and the whole crop *ſeems* to be rye-graſs,—although, in fact, there is as much clover as if it had not been manured at all.

This is a very ſatisfactory proof of the influence of one manure in promoting the growth of a particular plant in preference to that of another. There are no doubt many others that the farmer is at preſent ignorant of.—I ſhall ſuggeſt a few.

It conſtantly happened, that, where a heap of ſoot has lain ſo long upon the ground as to deſtroy all the plants upon its ſurface, the firſt plant that appears afterwards is the common couch-graſs *.

It as univerſally happens, that the firſt plant that appears where a heap of common ſtable-dung has lain, is the common knot-graſs †.

Sain-foin thrives upon the thinneſt lime-ſtone, gravely, or chalky ſoils, with great luxuriance,

* *Triticum repens.* † *Polygonum aviculare.*

luxuriance, even where theſe are ſo poor as to afford a very ſcanty crop of other ſorts of graſs.

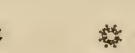
On much richer ſoils, that are not ſo highly impregnated with calcareous matter, that plant only languiſhes—on many occaſions it dies entirely.—Hence ſainfoin is a moſt valuable crop in chalky countries,—in others it is juſtly thought of no value.

Lime ſeems to promote the growth of rye-graſs in a higher degree than it does the growth of feather-graſs.—For, in fields that naturally abound with this laſt, and in which it even gets the better of rye-graſs when it is ſowed,—if the ground be limed, the rye-graſs flouriſhes and deſtroys the other;—and, when that fails, it is ſucceeded by white clover and the poa-graſſes, rather than by the feather-graſs.

XLII.

XLII.

There is reaſon to ſuſpect that certain manures which operate moſt powerfully upon ſome ſoils, do not promote the fertility of other ſoils in the ſmalleſt degree.—It would ſurely be of great uſe to the practical farmer to be made acquainted with theſe peculiarities.



In the part of the country where I was born, and firſt practiſed agriculture, no manure whatever produced ſuch a powerful and laſting effect as horn ſhavings.—Compared with the beſt yard (midding) dung, in the proportion of one ſtone of ſhavings to a cart-

load

load * of dung, the effect of the firſt was, at the beginning, about equal, but; after the firſt crop, it was greatly ſuperior.

In the place where I now reſide, I have found the effect extremely different.—A field of a good loamy ſoil, little different in appearance from thoſe on which I had formerly laid this manure with ſucceſs, was fallowed, and got a thorough dreſſing of horn ſhavings.—It has ſince that time carried ſeven crops of corn and graſs; but I have been able to perceive no ſenſible effect of the manure on any of theſe crops. There has hardly been even a ſingle tuft of grain more buſhy and ſtrong in one part of the field than

* Nothing is ſo indefinite as a cart or waggon-load of things of this ſort, that are not commonly weighed or meaſured; therefore, it were to be wiſhed that writers on agriculture would endeavour to define them accurately.——The cart load here meant may be a quantity between thirty and thirty-ſix buſhels.

than another;—a circumſtance that could hardly be avoided in uſing this manure, from the impoſſibility of ſpreading it ſo equally as is neceſſary.

Common ſalt is another manure that I have tried almoſt with the ſame ſucceſs. It is well known, from numberleſs well authenticated experiments, that the moſt ordinary effect of this manure is, to promote the fertility of the ſoil in a very ſenſible degree, for a ſhort time, when uſed in moderate quantities, and to check the vegetation of every kind of plant for a certain period, if employed in an over proportion.

To try the effect of it upon my own particular ſoil, I fixed a pin in the middle of a plot of graſs in the month of May,—and round that, as a centre, deſcribed a circle of two yards diameter.—Around the inner circumference of that circular line, I ſtrewed ſome common ſalt very thin, making it gradually thicker and thicker as it came towards the

the centre, till, at the pin itſelf, the ſalt lay near an inch thick upon the graſs.

The whole was ſoon diſſolved by the dews and rains, which were not copious at that ſeaſon. I looked with impatience to obſerve the effect of the experiment,—but with aſtoniſhment obſerved, that the ſpot could not have been diſtinguiſhed from the reſt of the green, except by the pin, which was allowed to remain in its place three years.

I leave philoſophers to account for theſe uncommon phaenomena.—Let the farmer, in the mean time, be taught from them, to proceed with cautious diffidence in the application of new and untried manures. For, it is not enough that he ſhould be *certain* that they have been attended with the moſt beneficial effects, when tried by another—before he can be aſſured of ſucceſs, he himſelf ought to try their effects by a *fair* experiment on a ſmall ſcale, and be determined in his practice

tice *at large*, by the result of that experiment, if it has been clear and decisive.

One other practical inference may be drawn from the above mentioned facts, which might be of service, if duly attended to.

Nothing is more common than to see writers on agriculture, who have lived in different parts of the country, accusing one another of falsehood and misrepresentation; because, perhaps, the one has recorded an experiment, with its result,—which has been tried by the other, with all imaginable fairness, who has found the result to be extremely different.—He repeats the experiment with all the necessary precautions,—but still the result is the same;—from whence he infers, that the first has told a falsehood to support some favourite theory.

Perhaps I myself might have been accused of this in the present case,—had not my own experience furnished both the results differing so much from one another.—But, if soils

differ ſo much from one another, in ſome of their moſt eſſential qualities, while they are not ſenſibly different in their external appearance,—ought we not to conclude, that the circumſtances that may affect the former, are often ſo much concealed, as to authoriſe no one to dictate poſitively for another in all caſes.—Let us then proceed with ardour in our reſearches, but with unceaſing caution and diffidence, whenever we exceed the limits of our own proper experience.—A man who, with confidence, preſcribes to others what ſhould be done *in all caſes*, is moſt certainly unacquainted with the art he profeſſes, and muſt often fail.—Nor would this be ſo much to be regretted, did not thoſe who are ſo ſanguine in the opinion of their knowledge, uſually adviſe others to proceed upon ſuch a large ſcale as muſt be attended with certain ruin to the undertakers, if it does not fully ſucceed.

Thus

Thus it appears, that, in whatever light we view this ſubject, we meet with much uncertainty and doubt. Were we to proceed forward, and conſider the nature and diſtinguiſhing qualities of different ſoils;—the ſeveral changes that may be produced upon theſe by culture or other circumſtances;—the properties of different manures, and the effects that theſe, in various circumſtances, produce upon the different ſoils;—the mode of cultivating each variety of plants, ſo as to bring it to its greateſt perfection;—the effects of theſe upon the ſoil, and the conſequences of all the different alternations of crops, with all the variety of collateral circumſtances that branch out from theſe capital heads; we would find the ſame uncertainty prevail throughout the whole,

as

as in that ſmall part that has juſt now engaged our attention, and might probably meet with a ſtill greater variety of dogmatic aſſertions and ill-founded opinions, maintained with a ſtill greater degree of obſtinacy, than the few that we have had occaſion to reprehend. But it was judged proper here to deſiſt. If, in the foregoing pages, it ſhould be imagined that the writer hath, on ſome occaſions, aſſumed a more deciſive tone than may ſeem to be conſiſtent with a work of this nature, he hopes the candid reader will be more diſpoſed to aſcribe it to that involuntary ardour that naturally ariſes in the mind when it contemplates objects that it deems of great importance to numbers of mankind, and the conſequent eager deſire that it feels to correct thoſe defects that appear to interrupt, in a high degree, the general good of ſociety, than to any ſiniſter cauſe.—His only aim has been to endeavour to attain to the knowledge of

uſeful

uſeful truths, with a view to promote, to the utmoſt of his power, the general happineſs of mankind: And, as the errors into which he may have fallen are involuntary, he will think himſelf obliged to thoſe who may point them out with candour, ſo as to enable him to correct them, if ever theſe ſheets ſhould come to another impreſſion.

APPENDIX.

APPENDIX.

LINNÆUS, who is juſtly celebrated for his knowledge in the different branches of *Natural Hiſtory*, gave the firſt hint for beginning the following ſet of uſeful experiments in rural oeconomy, which were afterwards proſecuted by ſome of his pupils, and publiſhed in the *Amoenitates Academicae*, under the title of the *Swediſh Pan.*

The deſign of this truly valuable ſet of experiments was, to aſcertain which of all the plants common in Sweden were eat, and which of them were refuſed by the five moſt valuable domeſtic animals, oxen, cattle, horſes, ſheep, and ſwine, that it might ſerve as a direction to the rural improver in the choice of plants proper to be cultivated by him for any particular purpoſe, as alſo to enable him to know what ſpecies of animals it would be moſt profitable for him to allow to be fed with the produce of any field in its natural ſtate.

Mr

Mr Stillingfleet tranſlated into Engliſh the introduction to this ſet of experiments,—but he omitted the experiments themſelves,— on account of the difficulty of making ordinary readers know the plants by the names that were given them.

I am not ſatisfied that this reaſon is ſufficient to prevent a tranſlation of this ſet of experiments from being of ſome uſe, even to the Engliſh reader; as few perſons are unacquainted with many of the plants by their Engliſh names; and as there are fewer ſtill, who have the ſmalleſt ſpirit of enterpriſe, who may not have an opportunity of getting the particulars about which they may be explained by ſome of their acquaintances, if they are really deſirous of it.

On this account, I have choſen to publiſh the experiments themſelves,—having ſubjoined the Engliſh names given to the ſeveral plants, taken from Hudſon's *Flora Anglica;* to

ſome

ſome of which I have added ſuch vulgar names as have come to my own knowledge.

I have likewiſe been tempted to undertake this, in ſome meaſure with a view to excite a deſire of attaining an adequate knowledge of botany among philoſophic farmers, who would reap many benefits from a competent proficiency in this ſcience.

The utility of this branch of ſcience will appear plainly from the peruſal of the following ſet of experiments. For, without its aid, it would have been impoſſible for any inhabitant of Britain to have been benefited by any of the facts contained in them; as it would not have been poſſible for them to have known, with certainty, any one plant mentioned through the whole of theſe numerous experiments; whereas, it is now eaſy to know, with the utmoſt certainty, every herb that occurs.

Thoſe who view botany in this light,—who conſider it as a neceſſary ſtep of that

ladder by which they may be enabled to attain uſeful knowledge, will look down with equal contempt on thoſe who reſt ſatisfied with being able to name every plant that may occur to them, and conſider this as the ultimate uſe and end of this ſcience; as of thoſe who, with a faſtidious pride of mind, deſpiſe this purſuit as mean and ignoble, and glory in their ignorance of a ſcience they think unworthy of the attention of men who are buſied in purſuits of things of real utility.

It is indeed no more at beſt than a vocabulary; and, although it be poſſible for one to learn all the words of a vocabulary, without attaining any knowledge of the language; yet it is impoſſible for a ſtranger to that language to attain a knowledge of it, without firſt retaining in his memory the words of which it conſiſts; which he will beſt attain by the aid of that vocabulary.

The

The ſcience the botaniſt ought to wiſh to attain, is the *knowledge of plants*.—The ſeveral ſyſtems of botany that have been invented, pretend to do no more than to claſs theſe plants in ſuch a manner as to facilitate the attainment of their names :—It is therefore of the greateſt importance, as a *mean of attaining knowledge* ; but, as an *ultimate end*, it is perhaps, the moſt trifling purſuit that can occupy the mind of man.

A man who values himſelf for his knowledge in this mere ſyſtem of claſſification, without aiming to make it of any other uſe, exactly reſembles him who ſhould glory in being able to repeat with facility all the words of any unknown language.—If the mere botaniſt adds any thing new, he may be of ſome uſe to others, by abridging their labour,—but muſt be conſidered as the verieſt dunce of a drudge that ever exiſted. His life is ſpent in the arduous purſuit of a ſhadow, inſtead of a reality.

Lin-

Linnæus,—although he has done more to aſſiſt others in attaining the names of plants with certainty and facility, than perhaps any other man,—ſeems to view the ſcience in its proper light; as he has endeavoured to extend the views of his pupils to the deſire of diſcovering ſuch plants as are endowed with qualities that may be of uſe to mankind. The following ſet of experiments is one ſatisfactory proof of this; and many others might be produced, were this a proper place for it.

We have reaſon to regret, that other eminent naturaliſts, who live in other parts of the world, have ſo ſeldom followed his example in this reſpect.—And it ought to cover them with ſhame, when they reflect that, under the influence of this ſingle man, the ſmall and inconſiderable kingdom of Sweden ſhould have produced a greater number of really valuable experiments on the uſes of plants, and other natural bodies, within theſe few years, than perhaps all Europe beſides; although

although the attainment of knowledge there is much more difficult than in many other places; and although it is next to impoſſible for the moſt ſucceſsful experimenter to publiſh his diſcoveries to the world, without almoſt a certainty of loſing by the publication.

The following experiments were publiſhed by Nicolas Haſſelgren in the year 1749, —who, after having mentioned the firſt hint for this purpoſe that was given by Linnaeus, in the relation of his journey to Dalicarlia, *ann.* 1734, and taking notice that his diſciple Profeſſor Kalm, in imitation of him, mentioned ſome of the plants that cattle eat or refuſed, which he had occaſion to remark in a journey he made to Bahus,—he adds,

" Anno 1747 and 1748, our preſident (Linnaeus) undertook, with great diligence, not only to make experiments himſelf, but to excite his diſciples and auditors to do the ſame; of which I was one. Thus, at laſt, many

many experiments were made, and repeated, eſpecially by D. D. Hagſtrom, Mag. E. G. Liidbeck, E. Ekelund, J. G. Wahlbom, L. Montin, F. Oldbers, J. C. Forſkahl, A. Fornander; not to mention others who ſtrove, as it were, to outdo one another in finding the plants, which were moſt ſuitable for different animals."

When ſhall Britain be able to produce ſuch a fraternity, emulouſly contending who ſhall moſt promote ſuch another ſet of uſeful experiments?

By this means, they were enabled to produce above two thouſand certain experiments, ſome of which were repeated, he aſſures us, ten times over, and ſome of them twice as often.

The plants were choſen when the leaves were in perfection, and were handled as little as poſſible before they were given to the different animals. They were offered to theſe animals when their bellies were pretty full; and every poſſible caution was taken to obtain

tain a perfect knowledge of what they voluntarily eat, and what they rejected.

It is not, however, to be doubted that, ſhould the ſame experiments be repeated by others, the reſult might differ in many inſtances.—Some individual animals are much nicer in their taſte than others *naturally*;—others, from *habit*, may be induced to eat with pleaſure many plants that they would have at firſt refuſed. From which circumſtances, the reſult of the ſame experiment, tried at different times, on different animals, might vary.

Nevertheleſs, it may, in general, be allowed as an undoubted fact, that whatever plant has, in any of theſe experiments, been eat by any claſs of animals, will, in general, be eat by other animals of the ſame claſs, if proper means are uſed for inducing thoſe that are ſhy at firſt to taſte it, and become acquainted with it.

But

But it is by no means certain, that, although all the animals of one claſs have refuſed a particular plant, other animals of the ſame ſort will on no occaſion be induced to eat of it. I ſhall have occaſion to take notice of ſeveral inſtances of this ſort that have come to my own knowledge, which ſhall be ſubjoined by way of notes to the table of experiments.

In the table that follows, the Latin generic name of the plant is firſt given in Roman characters, after which follows the name of the ſpecies in Italics—which is ſucceeded by the Engliſh name, taken from Hudſon's Flora Anglica.

The following letters indicate the duration of the different plants:—A, ſignifies an annual plant; B, a biennial; P, a perennial; T, ſignifies a tree or ſhrub; and the numbers I. II. III. &c. ſhow the times of their flowering, viz. January, February, March, &c.

The

The five columns on the right hand ſerve to denote the five domeſtic animals to which the plants had been offered. The firſt marked O. *oxen*—the ſecond G. *goats*—the third Sh. *ſheep*—the fourth H. *horſes*—and the fifth Sw. *ſwine*.

The marks in theſe columns, oppoſite to the name of every plant, ſhow whether that plant was eat or refuſed by the animals expreſſed in each column.—By the mark (1) is denoted that the plant was eaten; by the mark (0) that it was refuſed; and by both of theſe (10) or (01) that it was ſometimes eat, and ſometimes refuſed: The letter (n) denotes that it was not tried with the particular animal in whoſe column it is placed, although there is no explanation of this in the original work.

The Swediſh naturaliſt arranged the plants according to the order they hold in the

Flora Suecica of Linnæus.—I have thought it better to alter that arrangement to one which, I imagine, is better adapted to the uſe of the farmer,—and which is divided into claſſes, according to the number of animals that eat each plant.

The firſt claſs contains ſuch plants as were either eat by all the five claſſes of animals, or only rejected by one of them.

The ſecond claſs contains thoſe that were eat by four, or rejected only by two.

The third contains thoſe that were eat by three, or rejected by three.

The fourth contains thoſe that were eat by two, or rejected by four.

The fifth contains thoſe that were not eat by any animal at all.

This arrangement is only broke through in ſome caſes, where a plant or two are placed with others of the ſame ſpecies, although differing a little from the others.

There

There are in the original table many plants that were not tried at all.—Theſe are here entirely omitted.

To aſſiſt the reader to turn to any plant he may wiſh to examine, a Latin and an Engliſh index are ſubjoined.

A TABLE, shewing what Plants are eat or neglected by the five most common Domestic Animals, Oxen, Goats, Horses, Sheep, and Swine.

§ 1.

		O.	G.	Sh.	H.	Sw.
1	Veronica *officinalis*. Male speedwell P. V. - -	1	1	1	1	o
2	——— *scutellata*. Narrow leaved water speedwell, P VI. -	1	1	1	1	n
3	——— *agrestis*. Germander Speedwell, or chickweed, A. V.	1	1	1	1	n
4	——— *hederifolia*. Ivy leaved Speedwell, or small hen-bit, A IV. V.	1	1	1	1	n
5	——— *triphyllos*. Trifid Speedwell, A V. VI. - - -	1	1	1	1	n
6	Anthoxanthum *odoratum*. Vernal or spring grass, P VIII. Tab. 9.	1	1	1	1	n
7	Milium *effusum*. Millet-grass, A VI. VII. - - -	1	1	1	1	n
8	Aira *caespitosa*. Turfy hair grass, P VII. VIII. - -	1	1	1	10	1
9	—— *flexuosa*. Small hair grass, P VII. VIII. - -	1	n	1	1	n
10	—— *montana*. Mountain hair grass, P VII. VIII. -	n	n	1	n	n
11	—— *caerulea*. Purple hair grass, P VIII. - - -	n	1	1	1	n
12	—— *canescens*. Grey hair grass, P VII. - - -	1	1	n	n	n
13	Poa *aquatica*. Reed meadow grass, P VII. - -	10	n	1	10	n
14	—— *compressa*. Creeping meadow grass, A VI. Tab. 8. -	1	1	1	1	n
15	—— *annua* Annual meadow grass, or Suffolk grass, A VI.—IX.	1	1	1	1	1
16	—— *pratensis*. Great meadow grass, A VI. Tab. 7. -	1	1	10	1	1
17	—— *angustifolia*. Narrow leaved meadow grass, A VII. - -	1	1	1	1	1
18	—— *trivialis*. Common meadow grass, P VI. VII. -	1	1	1	1	1

		O.	G.	Sh.	H.	Sw.
19	Poa *alpina*. Alpine meadow grafs, - - - -	1	1	1	1	n
20	Briza *media*. Middle quaking grafs, cow quakes, and ladies hair, P VI.	1	1	1	n	n
21	Cynofurus *Criftatus*. Crefted dog's tail grafs, P VIII. Tab. X.	n	n	1	n	n
22	——— *caeruleus*. Blue dogs tail grafs P VII. - -	n	1	1	1	o
23	Dactylis *glomeratus*. Rough cocks foot grafs, P VI.—VIII. -	o	1	1	1	n
24	Bromus *fecalinus*. Field brome grafs, A V. VI. - -	1	1	1	1	n
25	——— *arvenfis*. Corn brome grafs, P VII. - - -	1	1	1	1	n
26	——— *giganteus*. Tall brome grafs, P VIII. - -	1	1	1	1	n
27	——— *pinnatus*. Spiked brome grafs, P VI. - -	n	1	10	1	n
28	Feftuca *fluitans*. Flote fefcue grafs, P VI. VII. - -	1	1	1	1	10
29	——— *rubra*. Purple fefcue grafs, P VI. * Tab. III. -	n	1	o	1	n
30	——— *ovina*. Sheeps fefcue grafs, P VI. VII. Tab. IV. -	1	1	1		1n
31	Avena *pratenfis*. Meadow oat-grafs, goofe grafs vulgo, P VII.	1	1	1	1	n
32	——— *fatua*. Bearded oat grafs, P VIII. - - -	n	1	1	1	n
33	——— *elatior*. Tall oat grafs, knot grafs vulgo, P VII. VIII.	1	1	1	n	n
34	Arundo *phragmites*. Common reed grafs, P VII. - -	1	1	o	1	o
35	——— *calamagroftis*. Branched reed grafs, P VI. VII. -	n	1	n	n	n
36	Triticum *repens*. Common wheat grafs, dogs grafs, quick grafs, or couch grafs, P VI.—VIII. † -	1	1	1	1	o

* Sheep I have found delight much to paſture on fields that abound with the purple feſcue graſs, and eat them quite bare.

† This graſs is not much liked either by oxen or horſes.

		O.	G.	Sh.	H.	Sw.
37	Scabiosa *arvensis*. Common field scabious, P VIII. -	10	1	1	10	o
38	——— *columbaria*. The lesser field scabious, P VIII. -	n	1	1	1	n
39	——— *succisa*. Devil's bit, P. VI.—VIII. - -	1	1	1	1	o
40	Asperula *odorata*. Woodroof, P V. - - -	1	1	1	1	o
41	——— *tinctoria*, - - -	1	1	1	1	o
42	Galium *aparine*. Cleavers, or goose grass. A V. VI. -	1	1	1	1	o
43	——— *uliginosum*. Marsh goose grass, P VII. VIII. -	1	1	1	1	1
44	Sanguisorba *officinalis*. Burnet, P - - -	1	1	1	1	n
45	Anchusa *officinalis*. Hounds tongue, P. VI. - -	1	1	1	1	10
46	Asperuga *procumbens*. Small wild bugloss, great goose grass, and German madwort, A IV. V. - - -	10	1	1	1	1
47	Ulmus *campestris*. Common elm tree, P - -	1	1	1	1	1
48	Laserpitium *latifolium*, - -	1	1	1	1	1
49	Heracleum *sphondylium*. Cow parsnip B VII. - -	1	1	1	10	1
50	Pimpinella *saxifraga*. Small Burnet saxifrage, P. VIII. -	1	1	1	1	1
51	Convallaria *bifolia*, - - -	1	1	1	1	1
52	Rumex *acetosa*. Common sorrel, - -	1	1	1	1	1
53	——— *acetosella*. Sheeps sorrel, P V. VI. VII. - -	1	1	1	1	1
54	Triglochin *palustre*. Arrow headed grass, P VII. VIII. -	1	1	1	1	1
55	——— *maritimum*. Sea spiked grass, P V. VI. - -	1	1	1	1	1
56	Sorbus *aucuparia*. Quicken, rawen tree, or mountain ash, T V.	1	1	1	1	1
57	Pyrus *communis*. The wild pear tree, T IV. - -	1	1	1	1	n
58	——— *malus*. The apple tree, T IV. - - -	1	1	1	1	n

		O.	G.	Sh.	H.	Sw.
59	Mespilus *cotoneaster*. The medlar, T V.	1	1	1	1	n
60	Rosa *canina*. Dog rose or hip tree, T V. VI.	1	1	1	10	1
61	—— *spinosissima*. Burnet rose, T VI.	1	1	1	0	1
62	Rubus *idaeus*. Raspberry bush, T V. VI.	01	1	1	0	1
63	——— *fruticosus*. Bramble, T V.—IX.	n	1	10	1	n
64	——— *caesius*. Small bramble, or Dewberry bush, T VI.	1	1	1	0	n
65	——— *saxatilis*. Stone bramble, P VI.	1	1	1	0	1
66	——— *Chamaemorus*. Cloud berries, or knout berries, P V. VI.	1	1	1	n	n
67	Fragaria *vesca*. Strawberry, P IV.	10	1	1	0	0
68	Potentilla *fruticosa*. Shrub cinquefoil, T VI.	1	1	1	1	0
69	——— *argentea*. Silver weed, or wild tansey, P VI. VII.	0	1	0	0	1
70	——— *repens*. Common cinquefoil, or five leaved grass, P VI.	1	1	1	1	n
71	——— *verna*. Spring cinquefoil, P V. VI.	1	1	1	1	n
72	——— *rupestris*. Upright bastard cinquefoil, P VII.	1	1	1	1	n
73	——— *norvegica*. Norwegian cinquefoil,	1	1	1	1	1
74	Thalictrum *flavum*. Meadow rue P VI.	1	1	1	1	10
75	Euphrasia *officinalis*. Eyebright, A VIII. IX.	1	1	1	1	0
76	——— *odontites*. Red eyebright, A VIII. IX.	1	1	1	1	n
77	Thlaspi *bursa pastoris*. Shepherd's purse, A III. IV.	1	1	1	1	1
78	Myagarum *sativum*. Gold of pleasure, A VI.	1	1	1	1	n
79	Crambe *maritima*. Sea Colwort, P. V.	1	1	1	1	1
80	Geranium *sanguineum*. Bloody crane's bill, P VII. VIII.	1	1	n	1	1
81	——— *sylvaticum*. Mountain ditto, P VII. VIII.	1	1	1	0	1

		O.	G.	Sh.	H.	Sw.
82	Geranium *pratenſe*. Crowfoot craneſbill, P VI. VII. -	1	1	1	1	1
83	——— *rotundifolium*. Round leaved craneſbill, A VII.	o	n	1	1	o
84	——— *columbinum*. Long ſtalked doves foot craneſbill, A VII.	n	1	1	n	o
85	——— *molle*. Common doves foot craneſbill, A V. VI. -	n	1	1	n	n
86	——— *robertianum*. Herb Robert, B IV. - -	n	1	o	1	o
87	——— *cicutrinum* Hemlock leaved craneſbill, A IV.—VI.	1	n	10	1	n
88	Polygala *vulgaris*. Milkwort, P. V. VI. Tab. XI. -	1	1	1	1	o
89	Geniſta *tinctoria*. Greenwood, dyers weed, or wood waxen, T VII.	1	1	1	1	n
90	Aſtragalus *glycyphyllos*. Wild liquorice, P. VI. VII. -	1	1	1	1	o
91	Anthyllis *vulneraria*. Kidney vetch, or lady's finger, P. VII.	1	1	n	n	n
92	Orobus *tuberoſus*. Wood peaſe, or heath peaſe, P V. -	1	1	1	1	n
93	——— *niger*. Black wood peaſe - -	1	1	1	1	o
94	——— *vernus*. Early wood peaſe, - -	1	1	1	1	n
95	Lathyrus *ſylveſtris*. Narrow leaved peaſe everlaſting, P VII. VIII.	1	1	1	1	n
96	——— *heterophyllus*, - - -	1	1	1	1	n
97	——— *pratenſis*. Tare everlaſting or common yellow vetchling, P VII. VIII. Tab. XII. - -	1	1	1	1	o
98	——— *paluſtris*. Marſh chickling vetch, P VII. VIII. -	1	1	1	1	n
99	Vicia *ſativa*. Common vetch, or tare, A V. VI. -	1	1	1	1	n
100	——— *ſepium*. Buſh vetch, P V. Tab. XIV. -	1	1	1	1	1
101	——— *ſylvatica*. Tufted wood vetch, P VII. VIII. -	1	1	1	1	n
102	——— *cracca*. Tufted vetch, P VII. VIII. -	1	1	1	1	10
103	Ervum *tetraſpermum*. Smooth tare, A IV. V. -	1	1	1	1	n

		O.	G.	Sh.	H.	Sw.
104	Ervum hirſutum. Hairy tare, A VI.	1	1	1	1	n
105	Piſum *arvenſe*. Common peaſe, A	1	1	1	1	n
106	—— *maritimum*. Sea peaſe, P VII.	1	1	1	1	n
107	Lotus *corniculata*. Birds foot trefoil, P VI.—VIII.	1	1	10	1	10
108	Trifolium *repens*. Dutch clover, white trefoil, P VI.—IX.	1	1	10	1	o
109	——— *pratenſe*. Purple or honeyſuckle trefoil, P V.—IX.	1	1	1	1	1
110	——— *arvenſe*. Hares foot trefoil, A VII. VIII.	n	1	n	n	n
111	——— *agrarium*. Hop trefoil, A. VI.	1	1	1	1	n
112	——— *procumbens*. Decumbent, or creeping trefoil, P V.—VIII.	1	1	1	1	1
113	——— *melilotus*. Common melilot, B VI. VII.	1	1	1	1	1
114	Medicago *falcata*. Yellow medick, P VII.	1	1	1	1	n
115	——— *lupulina*. Melilot trefoil, A V.—VIII.	1	1	1	1	n
116	Ononis *mitis*. Creeping reſt harrow, P	1	1	1	o	o
117	——— *ſpinoſa*. Reſt harrow, or cammock, P VI.—VIII.	1	1	1	o	o
118	Sonchus *arvenſis*. Tree ſow thiſtle, P VIII.	1	1	n	1	n
119	——— *oleraceus*. Common ſow thiſtle, A VI.—VIII.	n	1	1	01	1
120	——— *alpinus*. Mountain ſow thiſtle,	1	1	1	1	1
121	Prenanthis *muralis*. Ivy leaved wild lettuce, P VII.	1	1	1	1	n
122	Scorzonera *humilis*,	1	1	1	1	1
123	Tragopogon *pratenſe*. Yellow goats beard, B VI.	1	10	1	1	1
124	Carduus *lanceolatus*. Spear thiſtle, B VII.	10	10	o	10	o
125	—— *nutans*. Muſk thiſtle, B VII.	10	o	o	1	n
126	——— *acaulis*. Dwarf caroline thiſtle, P VII.	o	n	n	n	n

		O.	G.	Sh.	H.	Sw.
127	Carduus *heterophyllus*,	1	1	1	1	o
128	——— *crispus*. Curled thistle, A VI.	1	1	1	1	n
129	——— *palustris*. Marsh thistle, P VII.	o	n	n	1	1
130	Solidago *virga aurea*. Common golden rod, P VIII.	1	1	1	1	1
131	Achillea *millefolium*. Common yarrow, or millfoil, P V. VII. * Tab. XVII.	10	10	10	1	1
132	——— *ptarmica*. Sneezewort, or goose tongue, P VIII.	1	1	1	1	1
133	Centaurea *scabiosa*. Great knapweed, or matfellon, P VI. VII.	o	1	1	1	1
134	——— *jacea*. Common knapweed, or matfellon, P VII. VIII.	1	1	1	10	10
135	——— *cyanus*. Blue bottles, A VII.	1	1	1	o	o
136	Humulus *lupulus*. The hop plant, P VI.	1	1	1	1	1

§ II.

137	Scirpus *sylvaticus*. Millet cyperus grass, P VII	1	1	1	1	o
138	——— *maritimus*. Round rooted bastard cyperus, P VIII.	1	n	n	n	n
139	——— *lacustris*. Bull rush, P VII. VIII.	o	1	o	n	1
140	——— *palustris*. Club rush, P VII.	o	1	o	1	1
141	——— *caespitosus*. Dwarf club rush, P VII.	n	1	n	n	n
142	Nardus *stricta*. Matt grass, P VI. VII.	10	1	10	1	o

* The finest pastures I ever saw, those especially on which horses, cattle, and sheep, chiefly delighted to feed, always abounded with this grass.

		O.	G.	Sh.	H.	Sw.
143	Phalaris *arundinacea*. Reed canary graſs, P VII.	1	1	1	1	0
144	——— *phleoides*,	n	1	1	n	0
145	Phleum *pratenſe*. Meadow catts tail graſs, P VII.	1	1	n	1	0
146	Alopecurus *pratenſis*. Meadow foxtail graſs, P V.	10	1	1	1	10
147	——— *geniculatus*. Flote fox tail graſs, P VI.—VIII.	1	1	1	1	0
148	Melica *nutans*. Melic graſs, P. VI. VII.	1	1	n	1	n
149	——— *ciliata*.	n	1	n	1	n
150	Agroſtis *ſpica venti*. Silky bent graſs, A VII.	n	1	0	1	n
151	——— *arundinacea*,	n	0	n	1	n
152	——— *rubra*. Red bent graſs, A VII.	n	0	10	1	n
153	——— *ſtolonifera*. Creeping bent graſs, P VIII.	1	n	1	1	n
154	——— *tenuiſſima*. Fine bent graſs, P VIII. *	1	1	n	1	n
155	——— *canina*. Brown bent graſs, P VII. VIII.	1	n	n	1	n
156	Gallium *verum* Yellow ladies bedſtraw or cheeſe renning, P VII. VIII.	10	1	1	0	0
157	——— *mollugo*. Wild madder or great baſtard madder, P VI. VII.	1	1	1	0	1
158	——— *borealis*,	10	1	1	1	0
159	——— *paluſtre*. White ladies bedſtraw, P VII.	1	0	1	1	0
160	Sherardia *arvenſis*. Little field madder, A V. VI.	0	1	10	1	n
161	Cornus *ſanguinea*. Cornel or dog berry tree, T VI.	0	1	1	1	0

* Horſes, cattle, and ſheep, will eat this graſs; but they leave it for almoſt any other ſort, and always ſtay with reluctance on the fields where it abounds.

		Ox	G.	Sh.	H.	Sw.
162	Cornus *fuecica*	o	1	1	1	1
16	Euonymus *europaeus*. Spindle tree, T IV. V.	1	1	1	o	n
164	Alchemilla *vulgaris*. Ladies mantle, P VI. VIII.	10	1	1	1	o
165	——— *alpina*. Cinquefoil ladies mantle, P VII.	1	1	o	o	o
166	Cufcuta *europaea*. Dodder, hillweed, or devil's guts, A VII.	1	01	1	o	1
167	Lycopfis *arvenfis*. Small wild buglofs, A VI.—IX.	1	1	1	1	o
168	Convolvulus *arvenfis*. Small bindweed, P VI. VII.	1	1	1	1	o
169	——— *fepium*. Great bindweed, P VII. VIII.	o	1	1	1	n
170	Polemonium *caeruleum*. Great valerian, or Jacob's ladder, P VI.	1	1	1	10	n
171	Campanula *rotundifolia*. Round leaved bell flower, P VIII.	1	1	1	1	o
172	——— *perficifolia*,	n	1	10	1	n
173	——— *latifolia*. Giant throatwort, P VII. VIII.	n	1	1	1	n
174	——— *trachelium*. Canterbury bells, P VII. VIII.	1	o	n	o	n
175	Ribes *rubrum*. Currants, T V.	1	1	1	10	n
176	—— *nigrum* Black currants, T V.	n	1	n	1	n
177	—— *alpinum* Sweet mountain currants, P V.	1	1	1	1	n
178	—— *uva crifpa*.	o	1	10	1	n
17	Daucus *carota*. Wild carrot, or bird's neft, B VI. VII.	1	1	1	1	n
180	Selinum *paluftre*,	1	1	n	1	n
181	——— *oreofelinum*,	o	n	1	1	n
182	Liguflicum *fcoticum*. Scotch fea parfley, B VII.	o	1	1	1	n
183	Angelica *fylveftris*. Wild angelica, P VI. VII.	1	1	n	c	1
184	——— *archangelica*.	1	1	1	o	1

		Ox.	G.	Sh.	H.	Sw.
185	Phellandrium *aquaticum*. Water hemlock, B	o	1	1	1	10
186	Cicuta *virosa*. Long leaved water hemlock, P VII.	o	1	1	1	n
187	Æthusa cynapium. Fools parsley, A VIII. IX.	1	1	1	1	1
188	Scandix *anthriscus*. Small hemlock chervil, with rough seeds, A V. VI.	1	1	1	n	n
189	——— *cerefolium*.	1	1	1	o	n
190	Chærophyllum *sylvestre* Myrrh, wild cicely, or cow weed, P V. VI. *	o	10	10	10	o
191	——— *temulum*. Wild chervil, P VI. VII.	o	n	o	n	n
192	Carum *carvi*. Carraways, P V. VI.	10	1	1	10	1
193	Aegopodium *podagrica*. Herb gerard, goutweed, or aſhweed, P V.	1	1	1	o	n
194	Apium *graveolens*. Smallage B VIII.	10	1	1	o	n
195	Viburnum *opulus*. Water elder, T V. VI.	1	1	1	10	n
196	Linum *catharticum*. Purging flax, A V. VI.	n	1	1	1	n
197	Ornithogalum *luteum*. Yellow ſtar of Bethlehem, P	o	1	1	1	10
198	——— *minimum*.	o	1	1	n	o
199	Juncus *effusus*. Common ſoft ruſh, P V.—VIII.	n	1	n	1	o
200	——— *glomeratus*,	n	1	n	n	n
201	——— *ſquarroſus*. Moſs ruſh, or gooſe-corn, P. VI.	n	n	n	1	n

* I have found, by experience, that ſheep eat this in the field early in the ſpring. Cattle uſually do not eat it while growing,—and ſometimes reject it when given them by the hand; but, after they have been accuſtomed to it for ſome time, they eat it as greedily as any plant whatever.

		Ox.	G.	Sh	H.	Sw.
202	Juncus *bufonius* Toad rush, A VII. VIII.	n	n	n	1	n
203	——— *bulbosus.* Bulbous rush, P VII.	1	1	1	1	n
204	——— *pilosus.* Common hairy wood rush or grass, P IX.	o	1	1	1	n
205	——— *campestris* Small hairy wood rush, P IV.	n	1	1	1	n
206	Trientalis *Europaea* Chickweed, winter green, P VI.	o	1	1	1	n
207	Epilobium *angustifolium.* Rosebay willow herb, P VII. VIII.	1	1	1	o	o
208	——— *hirsutum.* Small flowered hairy willow herb, P VII.	10	1	1	1	o
209	——— *montanum.* Smooth leaved willow herb B VI.	n	1	n	10	o
210	——— *palustre.* Marsh willow herb, P VII.	n	1	1	1	o
211	Erica *vulgaris.* Common heath, or ling, T VI.—VIII.	1	10	10	1	o
212	—— *tetralix.* Cross leaved heath, T VII. VIII.	n	1	n	n	o
213	Vaccinium *uliginosum.* The great billberry bush, T IV. V.	1	1	1	1	o
214	——— *myrtyllus.* Black Whortleberries, or billberries, T IV. V.	o	1	10	o	n
215	— ——— *vitis idaea.* Red whortleberries, T IV. V.	o	1	o	o	n
216	——— *oxycoccus.* Cranberries, moss, or moor-berries, T IV. V.	o	1	o	o	1
217	Polygonum *amphibium.* Perennial arsmart, P VI. VII.	o	1	1	1	1
218	——— *persicaria.* Dead or spotted arsmart, A VIII. IX.	o	1	1	1	o
219	——— *viviparum.* Small bistort, or snakeweed, P VI.	1	1	10	o	1
220	——— *aviculare.* Knot grass, A VI.—IX.	1	1	1	1	1
221	——— *convolvulus.* Black *bindweed,* A VI.—IX.	1	1	o	o	o
222	——— *fagopyrum.* Buck wheat, or brank, A VII. VIII.	1	1	1	o	o
223	Dianthus *deltoides.* Maiden pinks, P VI. VII.	1	1	1	1	o
224	——— *arenarius.* Stone pink, P VII.	1	n	1	1	n

		Ox.	G.	Sh.	H.	Sw.
225	Dianthus *armeria*. Deptford Pink, A VII.	1	n	1	n	n
226	Cucubalus *behen* Bladder campion, or white corn campion, P VII.	1	1	1	0	0
227	——— *dioicus*,	10	1	1	1	1
228	Silene *nutans*. Nottingham catchfly, P VI. VII.	0	1	1	1	1
229	—— *rupestris*,	n	n	n	1	n
230	—— *viscaria*,	0	n	1	10	10
231	Alsine *media*. *Common chickweed*, A I. III.	1	0	10	1	1
232	Stellaria *graminea*. Leffer ſtitchwort, P VII.	1	1	1	1	1
233	——— *pentagyna*,	n	n	1	1	1
234	Spergula *arvensis*. Corn ſpurrey, yarr, A VIII. *	0	1	1	1	1
235	Agroſtemma *githago*. Cockle, A VI.	n	1	1	1	n
236	Lychnis *flos cuculi*. Meadow pinks, wild Williams, or cuckow flower, P VI.	n	1	1	1	n
237	Oxalis *acetoſella*. Wood ſorrel, P IV.	01	1	1	0	1
238	Sedum *telephium*. Orpine, or live long, P VIII.	1	1	1	0	1
239	——— *album*. White ſtone crop, P VI. VII.	n	1	0	n	n
240	——— *acre*. Wall ſtone crop, or pepper, P VI.	0	1	0	0	0
241	——— *ſexangulare* Inſipid ſtone crop, B VII.	n	1	n	n	n
242	Lythrum *ſalicaria*. Purple ſpiked looſe ſtriſe, or willow herb, P VII.	1	1	1	1	0
243	Prunus *padus*. Wild cluſter, or bird cherry, T V.	10	1	1	0	1

* There is no plant I know that cattle or ſheep are more greedy of eating green,—either as it grows, or when cut, than this one.

		Ox.	G.	Sh.	H.	Sw.
244	Prunus *ſpinoſa*. Black thorn, or ſloe tree, T III. IV.	n	1	1	1	n
245	Crataegus *aria*. White beam tree, T V.	n	1	1	n	n
246	——— *oxycantha*. White thorn, or hawtree, T V.	1	1	10	1	n
247	Spirea *filipendula*. Dropwort, T VII.	1	1	1	o	1
248	—— *ulmaria*. Meadow ſweet, P VI. VII.	o	1	1	o	1
249	Tormentilla *erecta*. Tormentil, or ſeptfoil, P VI.	1	1	1	o	1
250	Comarum *paluſtre*. Purple marſh cinquefoil, P VI.	10	1	10	o	o
251	Geum *urbanum*. Common avens, or herb-bennet, P VI. VII.	1	1	1	10	1
252	——— *rivale* Water avens, P VII.	o1	1	1	10	10
253	Tilia *europaea*. Lime, or Linden tree, T VII	1	1	1	1	n
254	Ciſtus *helianthemum*. Dwarf ciſtus, or little ſunflower, P VII.	n	1	1	1	o
255	Lionurus *cardiaca*. Motherwort, B VII.	o1	1	1	1	o
256	Prunella *vulgaris*. Self-heal, P VIII.	1	1	1	10	n
257	Scutellaria *galericulata*. Hooded willow herb, P VIII.	1	1	1	o	o
258	Melampyrum *criſtatum*. Creſted cow wheat, A VII.	1	1	1	o	o
259	——— *arvenſe*. Purple cow wheat, A VII.	1	1	o	n	n
260	——— *nemorum*.	1	1	1	1	n
261	——— *pratenſe*. Meadow cow-wheat, A VII.	1	1	1	o	o
262	——— *ſylvaticum*. Yellow cow wheat, A VI.—VIII.	1	1	1	n	n
263	Euphraſia *officinalis*. Eyebright, A VIII. IX.	1	1	1	1	o
264	——— *odontites*. Red eyebright, A VIII. IX.	1	1	1	1	n

		Ox.	G.	Sh.	H.	Sw.
265	Draba *verna*. Common Whitlow grafs, A IV.	10	1	1	1	0
266	——— *incana*. Wreathen poded Whitlow grafs, B V.	10	1	n	n	n
267	Braſſica *campeſtris* ——— cabbage,	1	1	1	0	1
268	——— *napus*. Wild navew, B V.	1	1	n	n	1
269	Sinapis *arvenſis*. Wild muſtard, or charlock, A V.	1	1	1	10	1
270	Siſymbrium *amphibium*. Water radiſh, P VI.	0	01	01	n	n
271	——— *pinnatifidum*.	1	n	1	1	1
272	——— *ſophia*. Flixweed, A VII.	1	10	1	10	0
273	Eryſimum *officinale*. Hedge muſtard, A V.	0	1	1	0	0
274	——— *cherianthoides*. Treacle wormſeed, A VII.	1	1	1	1	1
275	——— *barbarea*. Winter creſſes, or rocket, P V.	1	10	10	0	0
276	——— *Alliaria*. Jack by the hedge, or ſauce alone, P V.	1	1	0	0	0
277	Malva *rotundifolia*. Dwarf mallow, A VI.—X.	01	0	1	1	n
278	—— *ſylveſtris*. Common Mallow, P V.—X.	1	n	n	n	n
279	—— *alcea*. Vervain mallow, P VII.—IX.	1	1	1	1	n
280	—— *moſchata*. Jagged leaved vervain mallow, B VIII.	1	n	0	1	n
281	Leontodon *taraxacum*. Dandelion, P IV.—VI.	01	1	10	0	1
282	——— *autumnale*. Yellow Devil's bit, P VIII.	0	1	0	1	1
283	Hypochaeris *maculata*. Long rooted hawkweed, P V.—VII.	1	1	10	1	1
284	Hieracium *alpinum*. Mountain hawkweed, P VII. *	n	n	n	n	n

* I have remarked that ſheep are extremely fond of all the plants of this claſs as well as the Leontodons.

		Ox.	G.	Sh.	H.	Sw.
285	——— *piloſella.* Common creeping mouſe-ear, A V.	o	1	10	o	n
286	——— *dubium.* Mouſe-ear hawkweed, P VII. VIII.	n	n	1	n	n
287	——— *auriculata.* Narrow leaved hawkweed, P VII.	o	n	1	n	n
288	——— *praemorſum,*	1	n	1	n	n
289	——— *murorum.* French, or golden lungwort, P VII.	n	n	n	1	n
290	——— *umbellatum.* Narrow leaved buſhy hawkweed, P VII. VIII. *					
291	Crepis *tectorum.* Smooth ſuccory hawkweed, A. VI—IX.	1	1	1	1	1
292	Lapſana *communis.* Nipplewort, A VI. VII.	1	1	10	10	1
293	Serratula *tinctoria.* Saw-wort, P VII.	1	o	1	1	1
294	——— *alpina.* Mountain ſaw-wort, P VII.	o	1	o	10	o
295	——— *arvenſis.* Corn ſaw-wort, or way thiſtle, P VII.	n	n	n	n	n
296	Tuſſilago *farfara.* Common coltsfoot, P III.	10	1	10	10	10
297	——— *petaſites.* Common butter bur, P III. IV.	10	1	1	o	o
298	Arnica *montana,*	1	1	1	1	n
299	Matricaria *ſuaveolens* Sweet ſcented fever-few, A V.	o	1	1	10	n
300	——— *chamomilla.* Corn fever-few, A V.	n	1	1	1	o
301	Viola *odorata.* Sweet violet, P III.	1	1	1	10	o
302	—— *canina.* Dogs violet, P IV.	n	n	n	n	n
303	—— *paluſtris.* Marſh violet, P VI.	1	1	1	o	1
304	—— *hirſuta.* Hairy violet, P III.	1	n	10	n	n
305	—— *mirabilis,*	1	1	1	1	n
306	—— *biflora,*	1	n	1	o	n
		n	1	n	n	n

		Ox.	G.	Sh.	H.	Sw.
307	Viola *tricolor*. Panfies, or heart's eafe, A V.—IX.	1	1	0	0	10
308	Carex *vulpina*. Great carex, P VII.	n	1	n	1	0
309	—— *muricata*. Prickly carex, P VI.	n	1	n	1	n
310	—— *digitata*,	n	n	1	n	n
311	—— *globularis*,	n	1	n	n	n
312	—— *filiformis*,	1	n	1	n	n
313	—— *capillaris*,	1	n	1	n	1
314	—— *panicea*. Pink carex, P VI. VII.	1	1	1	n	n
315	—— *pfeudo-cyperus*. Baftard carex, P VII.	1	1	1	n	n
316	—— *caefpitofa*. Turfy carex, P V. VI.	1	1	1	1	n
317	—— *veficaria*. Greater bladder carex, A VI.	1	1	1	n	n
318	—— *acuta*. Brown carex, P V.	1	1	1	1	0
319	Betula *alba*. The birch tree, T VII.	1	1	1	1	0
320	—— *alnus*,	1	1	1	1	0
321	—— *nana*. Dwarf birch,	1	1	1	1	n
322	Quercus robur. The oak tree, T IV.	1	1	1	1	n
323	Fagus *fylvatica*. The beech tree, T V.	n	1	1	n	n
324	Carpinus *betulus*. The hornbeam tree, T V.	1	n	n	n	n
325	Salix *pentandria*. Sweet willow, T IV.	n	1	1	n	n
326	—— *amygdalina*. Almond leaved willow, T V.	n	1	n	1	n
327	—— *cinerea*,	n	1	n	1	n
328	—— *caprea*. Common fallow, T IV. V.	1	1	1	1	n
329	—— *alba*. Common white willow, T IV.	1	1	1	1	n

		Ox.	G.	Sh.	H.	Sw,
330	—— *viminalis*. The oſier, T. IV. - -	1	1	1	1	n
331	Hippophae *rhamnoides*. Sallow thorn, or ſea buckthorn, T IV.	0	1	1	1	n
332	Populus *tremula*. Trembling poplar, or aſp tree, T III. -	n	1	1	0	0
333	——— *alba*. White poplar, T III. - -	10	1	1	1	n
334	——— *nigra*. Black poplar, T III. - -	1	1	1	1	n
335	Mercurialis *perennis* Dogs mercury, P IV. V. -	0	1	1	n	n
336	Juniperus *communis*. Common juniper, T V. -	n	1	1	1	n
337	Atriplex *laciniata*. Jagged ſea orache, A VIII. -	1	n	n	n	n
338	——— *haſtata* Wild orache, A VIII. IX. - -	1	n	n	n	n
339	——— *patula* Narrow leaved orache, A VIII. -	1	1	1	n	1
340	——— *portulacoides*. Sea purſlain, T VIII. - -	1	1	1	1	0
341	Fraxinus *excelſior*. Common aſh tree, T. III. IV. -	1	1	1	1	0
342	Equiſetum *arvenſe*. Corn horſe tail, P III. - -	0	1	10	0	n
343	——— *ſylvaticum*. Wood horſe tail, P IV. V. -	n	1	n	1	n
344	——— *paluſtre*. Marſh horſe tail, P VI - -	n	1	n	n	n
345	——— *fluviatile*. River horſe tail, P V. . .	10	1	1	1	1
346	——— *hyemale*. Rough horſe tail, or Shave graſs, P VII. VIII.	0	1	0	n	10

§ III.

347	Liguſtrum *vulgare*. Privet, or Prim, T V. - -	1	1	1	0	0
348	Veronica *maritima*. - - -	1	1	1	0	0
349	——— *ſpicata*. Upright ſpiked male ſpeedwell, or Flewellin, P VI.	1	0	1	0	n

		Ox.	G.	Sh	H.	Sw.
350	—— *anagallis*. Long leaved water ſpeedwell, P VII. -	1	1	1	o	o
351	—— *becabunga*. Common brooklime, P VI. -	1	1	n	1	o
352	—— *chamaedrys*. Wild germander, P V. - -	1	1	o	o	o
353	—— *alpina*. Stalked ſpeedwell, P V. - -	1	1	1	n	n
354	—— *ſerpyllifolia*. Paul's betony, little, or ſmooth ſpeedwell, P V.	n	n	1	n	n
355	—— *peregrina*. - -	n	n	o	n	n
356	—— *arvenſis*. Speedwell, or Chickweed, A V. -	n	n	n	1	n
357	Elymus *arenarius*. Sea lime graſs, P V. VI. -	1	1	o	1	n
358	Hordeum *murinum*. Wall barley graſs or Way bennet, A IV.—VIII.	n	n	1	1	n
359	Plantago *major*. Great plantain, or Way bread, A VI. VII. -	o	1	1	o	1
360	—— *media*. Hoary plantain, P VII. VIII. - -	o	1	1	o	1
361	—— *lanceolata*. Narrow leaved plantain, or Ribwort, P VI. VII.* Tab. XV. - - -	o	1	1	1	n
362	—— *dubia*. - - - -	n	1	1	o	n
363	—— *coronopus*. Buckthorn plantain, Star of the earth, A VII. VIII.	n	1	1	n	n
364	—— *maritima*. Narrow leaved plantain, P VI. VII. Tab. XVI.	10	1	1	n	n
365	Lithoſpermum *officinale*. Gromell, or Gromwell, P V. VI.	o	1	1	o	n
366	—— *arvenſe*. Baſtard alkanet, A V. VI. -	10	1	1	o	o
367	Pulmonaria *officinalis*. Bugloſs cowſlips, or long leaved ſage of Jeruſalem, P V. - - - -	01	1	1	o	o
368	Primula *vulgaris*. Common primroſe, P IV. V. -	01	1	1	o	o

* Plantago *lanceolata*. Cattle eat this plant very readily, as I have often experienced.

		Ox	G.	Sh.	H.	Sw.
369	——— *farinoſa*. Birds eye, P V.	o	1	1	1	n
370	Samolus *valerandi*. Round leaved water pimpernel, P VI.	1	1	1	o	n
371	Lyſimachia *vulgaris*. Yellow willow herb, or looſeſtrife, P VI. VII.	1	1	10	o	o
372	——— *thirſiflora*. Tufted looſeſtrife, P VI.	01	1	10	o	o
373	——— *nummularia*. Money wort, P VI.	1	10	1	o	n
374	Lonicera *periclymenum*. Common honeyſuckle or woodbine, T V. VI.	1	1	1	o	n
375	——— *Xyloſteum*.	o	1	1	o	n
376	Rhamnus *catharticus*. Buckthorn, T IV. V.	o	1	1	1	n
377	——— *frangula*. Blackberry bearing alder, T. IV. V.	o	1	1	n	n
378	Herniaria *glabra*. Smooth rupturewort A VII.	1	o	1	1	o
379	Chenopodium *bonricus*. Common Engliſh mercury or allgood, P VIII.	o	10	10	o	o
380	——— *urbicum*. Upright blite, A VIII. IX.	o	1	1	o	n
381	——— *rubrum*. Sharp leaved gooſefoot, A VIII.	1	1	1	o	1
382	——— *murale*. Common gooſefoot or ſowbane, A VIII.	1	n	n	n	n
383	——— *album*. Common orache, A VIII.	1	1	1	o	1
384	——— *hybridum*. Mapple-leaved blite, A VIII.	1	o	1	o	o
385	——— *viride*. Green blite, A	n	1	1	n	1
386	——— *glaucum*. Oak leaved blite, A VIII.	1	n	n	1	n
387	——— *vulvaria*. Stinking orache, A VIII.	1	1	1	1	o
388	——— *polyſpermum*. Round leaved blite, or all-ſeed, A	1	o	1	o	n
389	Athamanta *libanotis*. Mountain ſtone-parſley, P VIII. IX.	o	n	1	n	1
390	Sium *latifolium*. Great water-parſnip, P. VII. VIII.	o	o	01	1	1
391	Parnaſſia *vulgaris*. Graſs of Parnaſſus, P VIII.	o	1	10	1	o

		Ox.	G.	Sh.	H.	Sw.
392	Statice *armeria*. Thrift, ſea-gillyflower, P VII. VIII.	o	1	10	1	o
393	——— *limonium*. Sea-lavender, P VII. VIII.	n	1	1	n	n
394	Allium *urſinum*. Ramſon, P V.	1	n	n	n	n
395	——— *ſcorodoprafum*,	1	o	o	n	o
396	——— *oleraceum* Wild garlick, P VII.	1	1	1	n	1
397	Aſparagus *officinalis*. Sparagus or ſperage, P VII. VIII.	1	1	1	o	o
398	Convallaria *majalis*. Cornwall lily, or May lily, P V.	o	1	1	o	o
399	——— *multiflora*. Solomon's ſeal, P. V. VI.	1	1	1	o	o
400	——— *polygonatum*. Sweet-ſmelling Solomon's ſeal, P. V.	o	1	1	o	o
401	Berberis *vulgaris*. Barberry, or pepperidge buſh, T.	1	1	1	o	o
402	Acer *platanoides*. Mapple tree, T	1	1	1	o	o
403	Papaver *dubium*. Long ſmooth-headed poppy, A VI. VII.	1	1	1	o	n
404	——— *rhaeas*. Red corn poppy, A VII. VII.	n	1	1	o	n
405	Euphorbia *helioſcopia*. Sunſpurge or wartwort, A VII.	o	01	01	1	n
406	——— *peplus*. Petty ſpurge, A VII.	o	n	n	10	n
407	——— *paluſtris*,	o	1	10	o	o
408	Delphinium *conſolida*. Wild larkſpur, A VI.	o	1	1	10	o
409	Trollius *Europaeus*. Globe flower, or Locker gowans, P V. VI.	o	1	1	o	1
410	Ajuga *pyramidalis*. Mountain-bugle or ſicklewort, P VI.	10	1	1	o	o
411	Origanum *vulgare*. Wild marjorum, P VII.	o	1	1	10	n
412	Mentha *arvenſis*. Corn mint, P VIII. IX.	o	1	01	1	o
413	——— *aquatica*. Water mint, P VII.	n	n	n	1	o
414	Galeopſis *tetrahit*. Nettle hemp, or hemp-leaved dead nettle, T VIII.	o	1	1	o	o

		Ox.	G.	Sh.	H.	Sw.
415	Rhinanthus *crista galli*. Yellow rattle, or cocks-comb, A VI. VII.	o	1	1	1	n
416	Lathrea *squamaria*. Toothwort, P IV. V.	o	1	1	o	1
417	Alyssum *incanum*.	10	1	1	o	n
418	Thlaspi *arvense*. Treacle mustard, or penny-cress, A VI. VII.	1	1	o	o	1
419	——— *campestre*. Mithridate mustard, or bastard cress, A VII.	10	1	o	o	1
420	Lepidium *perenne*. Dittander, or pepperwort, P VI. VII.	1	1	1	o	n
421	——— *osyris*.	1	1	n	o	o
422	Turritis *glabra*. Great tower-mustard, A V.	1	1	1	o	o
423	——— *hirsuta*. Hairy tower-mustard, B VI.	o	n	n	n	n
424	Cardamine *pratensis*. Common ladies smoke, or cuckow flower, P IV.	10	1	1	o	o
425	—— ——— *amara*. Bitter cresses, or ladies smoke, P IV. V.	10	n	1	n	n
426	Fumaria *officinalis*. Fumitory, A IV.—VI.	1	10	1	o	o
427	——— *bulbosa*.	10	1	n	n	n
428	Hypericum *quadrangulare*. St Peter's wort, P VII.	1	1	1	o	o
429	——— *perforatum*. St John's wort, P VII.	1	1	1	o	o
430	——— *hirsutum*. Tutsan, or hairy St John's wort, P VII.	n	n	1	o	n
431	Cichorium *intybus*. Wild succory, B VII. VIII.	o	1	1	o	1
432	Arctium *lappa*. Burdock, or clot-bur, B VII. VIII.	1	1	o	o	or
433	Artemisia *vulgaris*. Mugwort, P VIII *.	10	10	o	10	o
434	——— *campestris*. Field southernwood, P VIII.	n	n	o	n	n

* Artemisia vulgaris—Sheep certainly eat the leaves of this plant when young, and are uncommonly fond of its roots.

		Ox.	G. Sh.	H.	Sw.
435	——— *rupeſtris.*	1	0 1	1	n
436	——— *abſinthium.* Common wormwood, P VIII.	0	10 1	10	0
437	——— *maritima.* Sea wormwood, P VIII.	0	0 0	1	n
438	Gnaphalium *dioicum.* Mountain cud-weed, or catſ-foot, P V.	0	0 1	1	1
439	——— *ſylvaticum.* Upright cud-weed, B VIII.	n	1 n	n	n
440	——— *uliginoſum.* Black-headed cud-weed, A VIII.	0	0 n	n	n
441	Senecio *vulgaris.* Common groundſel, or Simpſon, A V.	10	1 0	0	1
442	——— *jacobæa.* Common ragwort, P VII *.	10	n 0	0	n
443	Inula *pulicaria.* ſmall fleabane, A VIII. IX.	0	0 1	0	n
444	—— *dyſenterica.* Middle fleabane, P VIII.	01	0 0	n	n
445	—— *helenium.* Elecampane, P VII. VIII.	0	1 0	1	0
446	—— *ſalicina.*	1	1 1	1	n
447	After *tripolinum.* Sea ſtarwort, P VIII.	0	1 10	1	0
448	Chryſanthemum *leucanthenum.* Greater daiſy, ox-eye, P V.	0	1 1	1	0
449	Anthemis *cotula.* Stinking May weed, A VI. VII.	0	01 01	0	0
450	——— *arvenſis.* Corn camomile, B VII.	1	n 1	10	n
451	——— *tinctoria.* Common ox-eye, P VII.	0	1 01	1	0
452	Cnicus *oleraceus.*	0	1 0	1	1
453	Calendula *officinalis.* Garden Mary-gold,	1	10 1	10	0
454	Zoſtera *marina.* Graſs wrack, P	01	n n	1	1
455	Sparganium *erectum.* Great bur-reed, P VII.	01	0 0	1	1

* Senecio jacobaea—Sheep likewiſe eat this plant greedily when young—Cattle ſeldom taſte it.

		Ox.	G.	Sh.	H.	Sw.
456	——— *natans*. The leaſt bur-reed, P VII.	1	n	n	n	n
457	Sagittaria *ſagittifolia*. Arrow-head, P VI.	10	1	n	1	1
458	Lycopus *Europaeus*. Water horehound, P VII.	o	1	1	o	n
459	Salvia *pratenſis*. Meadow clary, P	o	1	1	o	n
460	Valeriana *officinalis*. Great wild Valerian, P VI.	o	1	1	o	o
461	——— *dioica*. Small wild, or marſh Valerian, P VI.	n	1	10	n	n
462	——— *locuſta*. Lambs lettuce, or corn ſallad, A IV. V.	n	1	1	n	n
463	Eriophorum *polyſtachyon*. Cotton graſs, P VI. VII.	o	1	1	o	o
464	——— *vaginatum*. Hares-tail ruſh, P II.—IV.	n	10	n	n	n
465	——— *alpinum*.	n	o	n	n	n
466	Lolium *temulentum*. Annual darnel graſs, A VII. VIII.	n	n	10	n	n
467	——— *perenne*. Perennial darnel graſs, or rye-graſs, P VI *.	1	10	o	n	n
468	Potamogeton *natans*. Broad leaved pond-weed, P VIII.	1	1	o	o	o
469	Symphytum *officinale*. Comfrey, P	1	o	1	o	o
470	Echium *vulgare*. Vipers bugloſs, P VII.	10	o	10	o	n
471	Androſace *ſeptentrionalis*.	o	1	1	n	o
472	Anagallis *arvenſis*. Male pimpernel, A VI.—VIII.	1	1	o	n	n
473	Verbaſcum *nigrum*. Sage-leaved black mullein,	o	o	10	o	1
474	Solanum *dulcamara*. Woody nightſhade, bitter-ſweet, P VII.	o	1	1	o	o
475	Hedera *helix*. Ivy, P	o	o	1	1	n

* Rye-graſs—The experience of almoſt every farmer in Britain can evince, that ſheep moſt readily eat this graſs, when in leaf; when in ſtalk, it is leſs palatable to all animals.

		Ox.	G.	Sh.	H.	Sw.
476	Sanicula *europaea*. Sanicle, P V. VI.	n	10	1	o	n
477	Anthericum *ramoſum*.	n	1	10	n	n
478	——— *calyculatum*. Scottiſh aſphodel, P IX.	n	o	o	n	n
479	——— *oſſifragum*.	1	n	o	1	o
480	Rumex *aquaticus*.	o	o	10	o	10
481	——— *criſpus*. Curled dock, P VI. VII.	o	o	n	n	n
482	——— *acutus* Sharp pointed dock, P VI *.	o	n	n	o	n
483	——— *digynus*. Round leaved mountain ſorrel, P VI.	n	1	n	n	n
484	Daphne *mezereon* Mezereon tree, T II.	o	1	1	o	n
485	Paris *quadrifolia*. Herb Paris, truelove, or one berry, P V. VI.	o	1	1	o	o
486	Andromeda *polifolia*. Marſh ciſtus, or wild roſemary, P III. IV	o	1	1	o	n
487	——— *caerulea*.	o	01	o	o	n
488	——— *hypnoides*.	o	01	o	o	n
489	Scleranthus *annuus*. German knot-graſs, or annual knawel, A VIII.	o	1	n	1	n
490	Cerastium *viſcoſum*. Broad leaved mouſe-ear chickweed, A IV. V.	o	1	o	1	n
491	——— *alpinum*. Mountain mouſe-ear chickweed, P VI.	1	n	1	n	n
492	——— *eupatoria*. Agrimony, P VI.	o	1	1	o	o
493	Sempervivum *tectorum*. Houſeleek, P VII.	n	1	1	n	n
494	Nymphaea *lutea*. Yellow water-lily, P VIII.	o	01	o	o	1
495	——— *alba*. White water-lily, P VII.	o	10	n	o	1

* Dock—Cattle feldom reject this plant, when it is cut and given them by hand—they never taſte it when growing in the field.

		Ox.	G.	Sh.	H.	Sw.
496	Actaea *spicata*. Herb Chriſtopher, or bane berries, P V. VI.	o	1	1	o	o
497	Aconitum *lycoctonum*.	o	1	10	o	n
498	Aquilegia *vulgaris*. Common columbine, P VI.	o	1	01	o	o
499	Anemone *hepatica*.	o	10	1	o	o
500	——— *pulſatilla*. Paſque flower, P IV.	o	1	1	o	o
501	——— *pratenſis*.	n	n	n	o	n
502	——— *nemoroſa*. Common wood anemone, P IV.	o	1	1	o	o
503	——— *verna*.	n	n	n	o	n
504	Ranunculus *flammula*. Leſſer ſpiderwort, P VI.—IX.	o	o	o	1	o
505	——— *ficaria*.	o	1	1	o	n
506	——— *auricomus*. Sweet-wood crowfoot, or goldilocks, P IV.	1	1	o	o	n
507	——— *ſceleratus*. Round leaved water crowfoot, A V. VI.	o	1	o	o	n
508	——— *acris*. Upright meadow crowfoot, P VI. VII.	o	1	1	o	o
509	——— *repens*. Creeping crowfoot, or butter cups, P V.	n	1	n	o	n
510	——— *bulboſus*. Bulbous crowfoot, or butter cups, P V.	o	n	n	o	n
511	Caltha *paluſtris*. Marſh marygold, P IV.	o	1	1	o	o
512	Teucrium *ſcordium*. Water Germander, P VIII	o	1	1	o	o
513	Thymus *ſerpyllum*. Mother of thyme, P VII. VIII.	n	1	1	n	o
514	——— *acinos*. Wild baſil, A. VII. VIII.	10	o	o	1	n
515	Clinopodium *vulgare*. Great wild baſil, P VIII.	n	1	1	o	n
516	Glechoma *hederacea*. Ground ivy, P V.	o	o	1	10	o
517	Stachys *ſylvatica*. Hedge nettle, P VII. VIII.	o	1	1	o	o
518	——— *paluſtris*. Clowns allheal, P VIII.	o	o	1	o	o

		Ox.	G.	Sh.	H.	Sw.
519	Lamium *album*. White dead nettle, or archangel, P V.	10	1	1	0	0
520	——— *purpureum*. Red archangel, or dead nettle, A V.	0	1	1	1	n
521	——— *amplexicaule*. Great hen-bit, A VI.	n	1	1	1	n
522	Pedicularis *ſylvatica*. Common louſewort, P V. VI.	0	n	n	n	0
523	——— *paluſtris*. Marſh louſewort, VI.	0	1	0	0	01
524	——— *ſceptrum carolin*.	1	1	n	0	n
525	——— *lapponica*.	n	1	1	n	n
526	Bartſia *alpina*. Mountain eyebright cow wheat, P VII.	n	1	1	n	n
527	Linnaea *borealis*.	0	1	1	0	0
528	Bidens *tripartitus*. Trifid water hemp agrimony, A VIII. IX.	1	0	1	0	0
529	——— *cernuus*. Whole leaved water hemp agrimony, A VII. VIII.	n	1	n	0	n
530	Tanacetum *vulgare*. Common tanſy, P VII.	1	0	1	0	0
531	Orchis *morio*. Female fool-ſtones, or orchis, P V. VI.	n	1	n	0	n
532	——— *conopſea*. Red handed orchis, B VI.	1	1	n	0	n
533	——— *latifolia*. Male handed orchis, P V. VI.	1	n	n	0	n
534	——— *maculata*. Female handed orchis, P VI.	10	0	1	0	n
535	Ophrys *ovata*. Common tway blade, P V. VI.	1	1	n	n	n
536	Xanthium *ſtrumarium*. Leſſer burdock, A VIII. IX.	0	1	0	1	0
537	Pinus *ſylveſtris*. Scottiſh fir, T V.	n	10	01	0	n
538	—— *abies*. Common pitch fir, T	n	1	0	n	n
539	Myrica *gale*. Gale, or ſweet willow, T	0	1	0	1	n
540	Taxus *baccata*. Yew tree, T	0	1	1	0	n
541	Rhodiola *roſea*. Roſewort, P VI. VII.	0	1	1	n	•

		Ox.	G.	Sh.	H.	Sw.
542	Polypodium *vulgare*. Common polypody, P.	n	01	o	n	n
543	——— *filix mas*. Male polypody, or fern, P	o	1	o	n	n
544	——— *fragile*. Brittle polypody, P	1	1	n	1	n
545	Carlina *vulgaris*. Wild carline thiſtle, B VI.	o	1	n	n	n

§ IV.

546	Salicornea *europaea*. Marſh ſamphire, jointed glaſſwort, or ſaltwort A VIII. IX.	o	n	o	o	1
547	Hippuris *vulgaris*. Mares-tail, P V.	o	1	o	o	o
548	Circaea *lutetiana alpina*. Enchanters nightſhade, P VI. VII.	n	n	1	n	n
549	Verbena *officinalis*. Vervain,	o	o	1	o	n
550	Iris *pſeudacorus*. Yellow water flower de luce, P VII.	o	1	o	o	o
551	Schoenus *albus*. White flowered ruſh graſs, P VII.	n	1	n	n	n
552	Sagina *procumbens*. Pearlwort, or chickweed breakſtone, A VI.	n	n	1	n	n
553	Myoſotis *paluſtris*.	o	1	o	n	o
554	Hottonia *paluſtris*. Water violet, P VII. VIII.	1	n	n	n	o
555	Hyoſcyamus *niger*. Common henbane, A VI.	o	01	o	o	o
556	Glaux *maritima*. Sea milkwort, or black ſaltwort, P VII.	1	n	n	n	n
557	Aſclepias *vincetoxicum*.	o	1	o	o	n
558	Gentiana *amarella*. Autumnal gentian, or fellwort, A VII. VIII.	n	n	1	o	n
559	——— *centaurium*. Leſſer centory, A VI.—VIII.	10	n	n	n	n
560	Tordylium *anthriſcus*. Hedge parſley, B VIII.	n	n	n	1	n

		Ox.	G.	Sh.	H.	Sw.
561	Conium *maculatum*. Hemlock, A VI. VII.	o	o	1	o	n
562	Ænanthe *fiſtuloſa*. Water dropwort, P VII.	o	n	n	o	n
563	——— *crocata*.	o	n	1	o	n
564	Sambucus *nigra*. Common elder, T V. VI.	o	o	1	o	n
565	Tulipa *ſylveſtris*. The tulip, P VI.	n	1	n	n	n
566	Aliſma *plantago*. Great water plantain, P VI.	o	1	o	o	o
567	Chryſoſplenium *alternifolium*. Alternate leaved golden ſaxifrage, P IV.	10	n	o	o	o
568	Adoxa *moſchatellina*. Tuberoſe moſchatel, P III. IV.	o	1	n	n	n
569	Pyrola *rotundifolia*. Common winter green, P VI. VII.	o	1	o	o	o
570	——— *ſecunda*. Dented leaved winter green, P VI.	n	1	o	n	n
571	——— *uniflora*.	o	1	o	n	n
572	Ledum *paluſtre*. Marſh ciſtus, or wild roſemary,	o	1	o	o	o
573	Saponaria *faſtigiata*.	n	o	1	n	n
574	Saxifraga *granulata* White ſingreen, or ſaxifrage, P V.	o	1	o	o	o
575	Arenaria *ſerpyllifolia*. The leaſt chickweed, A V.	n	n	o	n	n
576	——— *trinervia*. Plantain leaved chickweed, A V.	n	n	10	n	n
577	——— *peploides*. Sea chickweed, P VI VII.	o	n	o	1	n
578	——— *rubra*. Purple flowered chickweed, or ſea ſpurry, A VI.	n	o	10	n	n
579	Aſarum *europaea*. Aſarabacca, P V.	1	n	n	n	n
580	Stratiotes *aloides*. Water aloe, or freſh-water ſoldier, P VI.	n	o	n	n	1
581	Nepeta *cataria*. Nap, or cat-mint, P VII.	o	o	1	o	o
582	Betonica *officinalis*. Wood betony, P VII. VIII.	n	o	1	n	n

		Ox.	G.	Sh.	H.	Sw.
583	Scrophularia *nodosa*. Knobby rooted figwort, P VII. -	o	1	o	o	o
584	Cochlearia *officinalis*. Common, or garden scurvy-grass, B IV. V.	1	o	o	o	n
585	——— *danica*. Danish scurvy-grass, B V. -	1	o	o	o	n
586	Isatis *tinctoria*. Woad, B VI. - -	1	o	o	o	n
587	Arabis *thaliana*. Coded mouse-ear, A V. -	n	n	10	n	o
588	Raphanus *raphanistrum* Wild charlock *. - -	o	n	n	1	n
589	Bunias *cakile*. Sea rocket, A VI. -	n	n	n	1	n
590	Eupatorium *cannabinum*. Hemp agrimony, or Dutch ditto, P VII. VIII. - -	o	1	o	o	o
591	Filago *pyramidalis*. - -	o	o	o	n	n
592	—— *montana*. The least cudweed, A VI. VII. -	o	o	1	n	n
593	—— *arvensis*. - -	o	n	n	n	n
594	Erigeron *acre*. Blue flowered fleabane, P VII. VIII. -	o	o	n	n	n
595	——— *uniflorum*. -	n	1	n	n	n
596	Impatiens *noli me tangere*. Quick in the hand, touch me not, A VIII.	o	1	o	o	n
597	Satyrium *viride*. Frog satyrion, or orchis, P V. VI. -	n	1	n	n	n
598	——— *nigrum*. -	o	o	o	n	n
599	Cypripedium *calceolus*. Ladies slipper, P VII. -	n	1	n	n	n
600	Typha *angustifolia* Narrow leaved cats tail, P VII. -	1	n	n	n	o
601	Bryonia *alba*. White bryony, P V. - -	o	1	o	o	o
602	Corylus *avellana*. The hazel tree, T I II. -	n	1	o	n	o

* Raphanus—Cattle certainly eat this when green, if cut and given by hand.

		Ox.	G.	Sh.	H.	Sw.
603	Empetrum *nigrum*. Black-berried heath, Crow, or crack-berries, P IV. V.	o	10	o	o	n

§ V.

604	Pinguicula *vulgaris*. Butterwort, or Yorkſhire fanicle, P V *	o	o	o	o	n
605	——— *alpina*.	o	o	o	o	n
606	——— *villoſa*.	o	o	o	o	n
607	Montia *fontana*. Water chickweed, A IV	o	n	o	o	o
608	Potamogeton *perfoliatum*. Perfoliated pond-weed, P VI. VII.	o	o	o	o	o
609	——— *lucens*. Long leaved pond-weed, P VI.	o	n	o	n	o
610	——— *criſpum*. Greater water caltrops, P V. VI.	o	n	n	n	n
611	——— *pectinatum*. Fennel leaved pond-weed, P VI.	n	o	n	n	n
612	Myoſotis *ſcorpioides*. Mouſe-ear ſcorpion graſs, P IV.— VIII.	o	o	o	o	o
613	——— *lappula*.	o	n	o	o	n
614	Diapenſia *lapponica*.	o	o	o	o	n
615	Datura *ſtramonium*. Thorny apple, A VII.	o	o	o	o	n
616	Verbaſcum *thapſus*. Great white mullein, high taper, or cows lung-wort, B VII.	o	o	o	o	o

* Pinguicula—This is the plant called by the vulgar *rot-graſs*; it is commonly imagined, that ſheep eat it greedily, and that it occaſions the rot in them. I never ſaw it touched by any animal.

		Ox.	G.	Sh.	H.	Sw.
617	——— *lychnitis*. Hoary mullein, B VII.	o	o	o	o	o
618	Solanum *nigrum*. Garden nightſhade, A VI. VII.	o	o	o	o	o
619	Salſola *kali*. Prickly glaſswort, A VII VIII.	o	o	o	o	o
620	Sambucus *ebulus*. Dwarf elder, walwort, Danewort, T VII.	o	o	o	o	o
621	Acorus *calamus*. Sweet-ſmelling flag, or calamus aromaticus, P V.	o	o	o	o	o
622	Polygonum *hydropiper*. Water pepper, or arſmart, A VII. VIII.	o	o	o	o	o
623	Butomus *umbellatus*. Flowering ruſh, or water gladiole, P VI.	o	o	o	o	o
624	Dryas *octopetala*. Mountain avens, P VII.	o	o	o	o	o
625	Aconitum *napellus*.	o	o	o	o	o
626	Ranunculus *aquatilis*. Various leaved water crowfoot, P IV. V.	o	o	o	o	o
627	Ballota *nigra*. Stinking horehound, A VII.	o	o	o	o	n
628	Marrubium *vulgare*. White horehound, P VII	o	o	o	o	n
629	Cochlearia *armoracia*. Horſe raddiſh, P V.	o	o	o	o	o
630	Dentaria *bulbifera*. Coralwort, P IV.	n	n	n	n	o
631	Spartium *ſcoparium*. Common broom, T V. VI *.	o	n	o	o	n
632	Onopordum *acanthium*. Cotton *thiſtle*, B VII.	o	o	o	o	n
633	Bellis *perennis*. Common daiſy, P III.—IX †	o	n	o	o	n

* Broom—Sheep ſometimes eat this in winter,—but they are greedy of the bloſſom, which they pick off with care.—They alſo eat the young pods.

† Daiſy—It is commonly imagined, that a field in which this plant abounds affords fine paſture; which proceeds from inaccurate obſervation.—The flowers are not touched, and

		Ox.	G.	Sh.	H.	Sw.
634	Calla *palustris.*	n	o	n	o	o
635	Myriophyllum *spicatum.* Spiked water *millfoil,* P VI. VII.	n	o	o	n	n
636	Asplenium *trichomanes.* Common maiden-hair, P	o	n	o	n	o
637	Acroſtichum *ſeptentrionale.* Forked, or horned fern, P	n	n	n	n	o
638	Chelidonium *majus.*	o	o	o	o	o

From the above Table it appears, That

Oxen have eat of	328	and refuſed	187	different plants. Total, 515
Goats	470		75	545
Sheep	422		111	533
Horſes	293		209	502
Swine	119		186	305
Total number of experiments,				2400

appear beautiful—the leaves remain uncropt, and appear luxuriant, without the appearance of rankneſs—while the other more valuable graſſes are bit cloſe to the ground.—I believe no animal eats this through choice—but, as it is ſmall, and cloſely mixed with other palatable plants, it is ſometimes cropt through neceſſity among them.

INDEX NOMINUM LATINORUM.

INDEX of the ENGLISH NAMES.

Ladies

Ragwort

Spindle

FINIS.

DIRECTIONS TO THE BINDER.

Volume II.

Do not pay any attention to the references on the plates, but insert them as under.

ERRATA.

Page 56. note, for *Poligonatum Aviculare* read *Avena elatior*
58. l 1. *for* It is *read* Is it
337. l 8. *for* time *read* lime
346. l 5. *for* former *read* farmer
352. l 15. *for* may be explained *read* may be at a loſs explained
138. l 1. and 2. *for* its and it *read* this and he
200. l 4. *for* Is there *read* Are there
339. laſt line, *for* lime-ſtone, gravelly *read* limeſtone—gravelly
223. l 6. *for* that it might *read* that might

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