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1808



THE
Formation and Management
OF
FLOATED MEADOWS;

WITH
CORRECTIONS OF ERRORS,
FOUND IN THE TREATISES OF
*Messrs. Davis. Marshall, Boswell,
Young, and Smith.*

ON
THE SUBJECT OF FLOATING.

TO WHICH IS ADDED,
A DISSERTATION
ON
THE SIZE OF FARMS.

BY THE REV. T. WRIGHT,
Rector of Oudd, near Northampton.

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Introductory Remarks

ON

THE SUBJECT OF FLOATING.

I SHOULD not have ventured thus, a fourth time, to enter the province of other men, if I had no passport to exhibit---if I had it not in my power to say, that by my former intrusions of this kind, I have, in some degree, served my country---if I had it not in my power to assert, that I have already caused more than four
B thousand

thousand acres to be converted into Floated Meadows---and that every acre so floated, has been increased three pounds in annual value.

Standing, therefore, upon this privileged ground, I presume, in obedience to the calls which I have received through the medium of my booksellers, and from other quarters, once more to deviate a little from the right line of my professional duty, and once more to offer myself as an advocate in the cause, and as a pilot in the practice of floating: and in the attempt to support these characters, I am sorry to say, that I shall find it necessary again to defend the fair fame of my muddy favourite, from the fresh, but foul aspersions of certain dabblers in spring-water.

To

To be again solicited, however, to resume this subject, is what I did not expect---what I did not desire; for, when I last ventured to obtrude myself upon the notice of the cultivators of land, Irrigation, as it was called, appeared to be so prominent a feature in agriculture, and was so zealously recommended by almost every one, who either felt himself qualified to write, or found himself competent to talk like an agriculturist, that I was persuaded the practice would soon be reduced to a plain system or science, within the reach of every man's understanding. I had entertained a hope to have seen, ere this, a professed Floater on every stream, and watered meadows on every rivulet. I had flattered myself in the expectation of seeing, long ago, this art in every county---in the admiration

and in the hands of the common farmer, without whose co-operation and example nothing extensively valuable in agriculture can be effected, either in the introduction of new practices, or in the modification of old ones.

These my hopes and expectations, however, have not been gratified; but have experienced, of late, a strong and in a certain degree, mortifying check; for when I came to reside in the county of Northampton, about two years ago, I could not find that either my book, or the practice of Floating had ever once been heard of or dreamt of, in this part of the kingdom; in a district too, where the capabilities for the adoption of the art are abundant, and where the occupiers of land excel in almost every other
 this
 branch

branch of husbandry, and are rationally upon the look-out for agricultural improvements. Stimulated by this disappointment, I immediately endeavoured to bring forward something more interesting, more palpable, and more convincing than a dry book. And having fortunately found two or three small portions of my glebe well situated to have the water drawn over them, I immediately employed my wondering labourers in cutting feeders and gutters, and in placing strong stake-hedges across the respective brooks as dams, by which means I soon brought the water to work upon five acres, not indeed with precise regularity, but with an effect sufficient to draw the attention of my neighbours to the practice, and at the same time to answer my private interested views: for I obtained,
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the first year, good spring feed, and a large crop of hay, and likewise of latter-mark, upon land that was very poor before; and this year, I had spring feed and a crop of hay nearly equal in value to those of the best old floated meadows. These objects, placed fairly in view, operated to conviction on the minds of those who saw them, and soon gained me several pupils, well calculated to give extension to the practice, and who have already shewn themselves not mere spectators, but actors in this department. One of these gentlemen, indeed, has not contented himself with imitations of what others have done in this way, but already stands forward as a principal or pattern to others. Not satisfied with private profit, he has liberally extended his view to that which must benefit the public.

Not

Not confiding implicitly in what writers have said in favour of this or that system of irrigation, he has taken the most effectual method of ascertaining which is really worthy of a preference. This gentleman, Mr. PEARCE, who resides at Chapel-Brampton, about four miles from the town of Northampton, on the Leicester road, a situation as central and as eligible, perhaps, as could have been selected, in order to give publicity to an agricultural improvement, has made a considerable alteration in the common form of the master-feeder and master-drain of this kind of meadows, which I shall have occasion to particularize by-and-bye, and which, in some situations, I think a real improvement; and he has brought into actual competition the two methods of Floating, which are most in use with us,

and

and which have frequently been opposed to each other upon paper and in conversation, that is, the Gloucestershire and the Dorsetshire. He has one meadow of eighteen acres, formed by TRIGGER, the late Mr. BAKEWELL'S favourite irrigator, according to the Dorsetshire mode; and he has a second meadow, of nearly the same size, constructed upon the ridge and furrow, or Gloucestershire plan, by EDWARD DOWDESELL, a floater, from South Cerney, the Gloucestershire floating Seminary: and to have it in my power to announce to the public such a competition as this, and two such specimens, and in such a situation, I can almost think a sufficient apology for my book, if none other existed. To this competition I refer any person who is in doubt which of the two methods ought to

to

to be adopted. To this criterion I appeal for a vindication of that preference, which I have uniformly given to the Gloucestershire System : but I must beg leave at the same time to intimate, that this competition does not rest upon grounds that are precisely equal and fair ; for the Dorsetshire meadow is the uppermost on the stream, and will have the water in its genuine turbid state immediately from the brook, whereas the Gloucestershire meadow receives the water by means of a long conductor, brought round the first meadow ; in which retarded conveyance some of the best contents of the water will be deposited, and will not reach the meadow. Thus the superior working of the water upon the Gloucestershire meadow will not be so apparent in its effects, as it otherwise would have been : and

another circumstance I ought not here to omit mentioning, that Mr. PEARCE has already altered the Dorsetshire meadow, in one or two defective instances, to the Gloucestershire form.

The art of Floating has now been practised in five counties at least, for the space of a century and a half; and it appears, from Mr. TATHAM'S Treatise on Irrigation, (who has given us a compilation of numerous instances of its adoption, from the Agricultural Surveys of Counties, and from various other publications), that it has sometime been in a progressive state; but, comparatively speaking, I can too justly say, that it is still very partially practised—still very generally misunderstood—still very strangely misrepresented; and appears to

me

me to be in danger of degenerating into a mere *wetting* of the land.

I have found most persons with whom I have either conversed or corresponded on the subject, though they have professed to have read BOSWELL, WRIGHT, and others, impressed with not only inadequate, but injurious ideas of the art: one esteems all water under this management equally efficacious; another imagines, that more depends upon the nature of the land, than on the quality of the water; another thinks, that the water is to be used chiefly in spring and summer; another supposes it possible to make great and extensive improvements by a very small quantity of water; and almost every one expects something preternatural from this use of water in its pure ele-

mentary state. These misconceptions, therefore, must still prove a powerful obstacle to the growth of this very valuable branch of husbandry. I have frequently been requested by gentlemen in distant parts of the kingdom, to send them men well acquainted with the art (from South Cerney, a village in Gloucestershire, which has long been, and still continues, a very valuable nursery for persons of this description) to float large tracts of land, where, when the floater has arrived, he has found the stream that was to accomplish all this, diminutive enough, according to his own expression, to flow through a pint cup; of course the work has either not been attempted, or, if the proprietor of the land has been hardy enough to persist in the execution, disappointment to the possessor,

essor, and discredit to the practice, has been the inevitable result. Indeed, in very few instances, in which I have sent men for this purpose, has there been found water sufficient to give an effectual covering to all the land, which has been thought capable of being floated. It is evident, therefore, that what has as yet been written on the subject, has by no means given a precise idea of the practice, but has, in some instances, had a worse tendency.

I feel it a duty therefore, that I owe to a certain part of the community, again to step forward, and endeavour to point out the causes of these opinions evidently founded in error; and thereby to counteract their injurious effects. For this purpose, instead of publishing another
 edition

edition of my Treatise on Watering, I shall take new ground, adopt new terms, and give a description as free as I can from provincial and technical words, and, if possible, not liable to misconception. I shall endeavour to convey only one idea of the true objects of the practice, at least the objects which the farmers in the county of Gloucester, (where I am persuaded that Floating, has been practised as long, upon as rational a system, and with as beneficial effects, as in any part of this country), wish thereby to obtain, and which I will venture to assert, ought to be the only objects in every county, and in every situation, where the climate is of the same temperature with that of England.

Any person, however, who has read **Mr. MARSHALL's Rural Economy of Gloucester,**

cester, or Mr. TURNER's Survey of the County, will be surprised on reading the above commendation of the Gloucestershire mode of floating; for in all their circumstantial and extended accounts of the husbandry of the district, he has found little or nothing said, of this very extraordinary method of fertilization, though it has prevailed there more than a century. Mr. MARSHALL has not even hinted at the practice, and Mr. TURNER has mentioned it in a way, that makes it appear insignificant.

As I proceed, I shall take the liberty of combating and contradicting many positions and assertions of different writers on this subject, which appear to me to have been the principal causes of the too general misconception of the practice.

I have

I have in the title, and other parts of this treatise, substituted the term *floating*, in the place of that of *watering*, as more expressive of the thing intended. The word *watering*, I fear, has not contributed towards a clear conception of the business, but has given a notion of water used merely for the purpose of wetting the land, for which a small quantity is sufficient; whereas the true practice requires a complete sheet of quick flowing water, at least an inch deep. Indeed, I do not know any one word that will give an adequate idea of the art. In the county of Gloucester and in Wiltshire, it is frequently called *drowning*, or winter drowning; but this runs into the opposite extreme, and denotes too much water in use, and seems to express water kept in a stagnant state, which is very pernicious,

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if suffered to continue any length of time. Irrigation is the classical and fashionable term used upon this occasion, but is too confined in its sense to give a full notion of the practice.

Floating, in my opinion, comes nearer to express what is meant by the practice in its most complete state, than any other word in our language: and it is probably the original appellation of the art; for we find it used by BLITH in 1653. I lay the more stress on this point, that I may, if possible, divert the attention of those who wish thus to improve their land, from small rivulets and springs, and fix it on a more ample source of manure. I wish to turn the thoughts of men of property to canals, and to rivers larger even than any that have hitherto been made serviceable

in this way ; and the improvement, they will find, will be proportionally large. For the water of every copious and rapid stream is loaded with manure of the most fertilizing quality ; and with this water, it is possible to make land almost as rich as you please, whatever be the nature of the soil, or of the subsoil, even without attending so nicely to system as you necessarily must, when clear spring water is used ; and by the contents of this turbid water, an entirely new soil is given to the land in the course of a few years.

And if many large rivers are rendered manageable by the expensive process of embankments, wears, pudling, &c. merely to work corn-mills, why should not the same means be used to obtain a greater object ? for I am confident, that in many situations,

situations, water may be made of much more extensive utility, in the floating of land, than in the working of corn-mills. Instances, in proof of this assertion, might be adduced from various rivers on which this practice prevails, but a convincing one occurs on the river on which lies my chief scene of action: I mean the river Churn, which is a branch of the Thames, and flows through Cirencester, in the county of Gloucester. On this river, the mills are numerous and valuable, but the improvement made by this stream in floating, is of much greater value. The mills within the distance of five miles, are ten, and are let for about 40*l.* each *per ann.* but the acres floated, within the same distance, are 1000, and each acre is improved three pounds in annual value, in-

dependent of the extra manure thereby afforded to other land.

The superior advantage, therefore, of Floating, compared with the product of the mills, is as 3000l. to 400l., and would be greater if the mills did not operate as an obstacle to the art, by claiming an exclusive right to the use of the water, and of course taking it from the meadows at pleasure, and at very critical times. In some situations, however, there is water enough to serve both the purpose of the mill, and of the meadow; and it seldom happens but that, where a mill can be thus worked, there a certain quantity of contiguous land may be floated. Whenever I pass by a rapid river, therefore, and see no use made of the many tons of rich
rich

rich manure that are suspended in its waters, and are thereby irrecoverably carried into the ocean, I cannot help feeling this as a momentous loss to the community.

I do not, however, here pretend to reject, or wish to depreciate the use of small rivulets, or spring water in floating; for in many instances, where skilfully managed, and where a rapid descent can be obtained, and upon good land, such water will be found highly beneficial, particularly that which has passed through strata of chalk. I only mean to say, that the effects of such water cannot be set in competition with those arising from the water of large streams; and that nothing very great, or very valuable, can be accomplished in this, or any other agricultural process,

process, without manure in substance. It is true, that any, even the thinnest water will, in a favorable spring, force a crop upon the poorest land, but this crop must be, as the land, of an inferior quality; for no one ever yet found good grass, or good hay upon bad land. I have a striking proof of this, in a meadow of my own; for I float with very clear spring-water, and with very muddy brook water in one and the same meadow. And the effect of the latter is most manifestly superior both in the quantity and the quality of the grass thereby produced, although it depends entirely upon the wetness of the season for its supply; but the former has the benefit of a never varying stream.

It may here be expected, before I proceed to take still greater liberties with,
what

what I call, the misconceptions of others, that I should declare what I mean by Floating, or state what are the objects and essentials of that mode to which I give so unreserved a preference.

The primary objects of floating, are, I assert, simply these two, to *procure a deposit of manure* from the water used, and by the water at the same time, to *shelter* the land from the severity of winter: and the chief essentials of the art are, that the water shall be made to flow over the surface of the land, *an inch deep*, during winter, and that every part of the works shall be so constructed, as to keep the whole of the water in constant motion. Without attention to these two last requisites, the above objects, to which all others are subservient, cannot be fully obtained; for if
the

the water does not flow an inch deep, you do not use as much water as might be effectually strained or sifted by the grass, and of course do not collect as much muck as might be collected, nor give a complete shelter to the land. If you use much more than an inch depth, and continue it for several weeks, you destroy your best grasses, which will not bear to be entirely under water for many weeks in succession: and if any of the works are cut entirely upon a dead level, a certain part of the water will be kept in a stagnant state, depositing its sediment in the ditches, more than on the surface of the meadow, and soaking into, and chilling the land. If, however, you can so form your meadow as to use the above quantity of water, on the whole, or a part of the land, and each part has a regular descent; the meadow will

will enjoy every encouragement and protection which grass-land is capable of receiving from the care or culture of man.

Indeed, if you exclude the chilling blasts of winter, any land that is in tolerable heart, will continue to encourage vegetation even in the month of January; but when you not only ward off the effects of wintry winds and frosts, but are incessantly applying manure of the richest quality to the roots, and round the stems of the grass, it may reasonably be expected, that vegetation will be kept up in a high degree, though the season should be intensely severe.

It may here be asked, will not spring-water answer the two above-mentioned purposes? I allow that it will completely

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answer

answer the latter, but not the former purpose. It will afford the same shelter to land that river-water does, and though it be apparently ever so clear, yet the grass acting upon it as a fine sieve, will collect from it some substantial manure; but this manure will not only be much less in quantity, but very inferior in quality. Were it practicable to float land with the water that daily flows through London Bridge, I am persuaded, that such use of it, for only two weeks in a season, (one week to be taken at the beginning, the other at the end of winter) would render the land thus overflowed, more productive than a whole winter's regular watering, with any the most favorable spring-water. The quantity of mud collected from the Thames water, even in this short space of time, if it were made to flow with a proper degree

degree of rapidity, would be very considerable, and its quality any one can judge of: and for a further illustration and confirmation of this point, I refer the reader to Mr. KIRWAN's very perspicuous Treatise on Manures, or to the quotations which I shall find it requisite to make from that valuable little book, in the remarks which I shall offer on some assertions of Mr. YOUNG, on the subject of irrigation.

The Advantages of Floating.

THE art of winter-floating is worthy of no mean commendation, on three especial accounts; or for its three leading or cardinal properties; namely, its affording grass at an unusual season, and when it is most wanted; its certainty in the hay crop;

and its requiring no dung. These properties I venture to estimate at 3l. per acre *per ann.* additional value, even upon good land, and much more upon bad land; and this estimate, I presume, will not be thought highly stated by any farmer who has had a full stock of cattle and sheep in a late spring, and has had it in his power to have recourse to a meadow of this description; nor will any person think it high who will take the trouble of perusing the detail of facts which I shall presently recite: for I have lately met with so pregnant an instance of its superior excellence, that I should by no means do justice to the subject if I withheld it from the public. It is an instance, which tends to place the most engaging feature of this practice in a striking point of view, and gives to the production of yearly green food its proper weight

weight and worth. Indeed the most valuable, and I had almost said, the only improvements of magnitude that have of late years been made, here, in agriculture, have been in the various provisions of green food, afforded for the necessity of winter, and for the more pressing wants of the two first months of spring. In this series of improvements, I beg leave to class this relative art, which, though it cannot, in every situation, be so widely extended as the cultivation of turnips, rape, cabbage, lucerne, &c. yet, where it can be fully executed, it will in no wise disgrace the relationship in which I have placed it, but will afford it abundant aid and support. For floated meadows not only require no manure from the farm-yard, but liberally encourage the plough, by affording an annual extra supply of
manure,

manure: and although by this practice, the farmer cannot provide green food for all the months of winter, yet he can, thereby, considerably shorten the wintry void; for in March and April, which are the two most trying months to the farmer, these meadows are covered with grass enough to receive any kind of stock, if the weather will permit.

The strong proof of the great utility of this practice, which I above allude to, is this:--Having heard that the proprietor of an old floated meadow, in the village which I have had occasion to mention before, had disposed of the produce of it, in a way that was well calculated to ascertain its real value, I wrote to a person who resides on the spot, requesting him to send me a particular account of the product of
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the meadow, and I received the following statement :

In order to make the most money of the spring-feed, the proprietor kept the grass untouched till the second day of April, from which time he let it to the neighbouring farmers, to be eaten off in five weeks, by the undermentioned stock, at the following rates per head : a sheep 10d. per week, a cow 3s. 6d. a colt 4s. The quantity of the land is eight acres.

	<i>£.</i>	<i>s.</i>	<i>d.</i>
107 Wether sheep, one week - -	4	9	2
8 Cows - - - ditto - -	1	8	0
4 Colts - - - ditto - -	0	16	0
	6 13 2		
	5		
Total of five weeks	33	5	10
3 Colts, 3 weeks to be added	1	16	0
	35 1 10		

After

After this statement, my correspondent, sensible that it is the spring crop which principally claims the attention of the public, and on which I ought to lay peculiar stress in recommending the practice, dismisses the subject with saying, that the hay crop was as usual, about fifteen tons, and was six weeks in growing.

The above sum, it should be observed, was made by the owner of this meadow, at a time when other grass-land is in a dormant state, or exhibits but feeble symptoms of vegetation. He had received more than four pounds an acre for his land, when his less fortunate neighbours were only looking forward to future crops, in which expectation he had more than an equally favourable prospect with them; for the hay and lattermath crops of a
floated

floated meadow, if one day's wetting can but be obtained, are never known to fail.

But the reader will perhaps see the advantages of this art, in a still stronger light, when he is told, that this meadow, which is now in the occupation of a miller, was a few years ago in the hands of a farmer, who, being at variance with the miller, was entirely deprived of the use of the water, for a whole winter, which unfortunately was succeeded by a very dry spring and summer; of course the spring-feed was lost, and the whole hay-crop of eight acres was only three tons. I have known one corner of this meadow mown three times in the course of a summer, and the grass carried into the stable for the horses.

Such a specimen of productiveness as the above, one would hope, will carry sufficient weight with it, to turn the scale against any objections to the practice, arising from a dread of expense, or from an aversion which many entertain to, what they style cutting their land to pieces; and will prevail upon every one, who possibly can, to adopt this mode of improving his land. I trust likewise, that the above instance of fertility, will be esteemed a proof that this is not merely book-farming, but is worthy the attention of real practical farmers; and in confirmation of this, I could adduce several instances of *renters* of land, having profitably expended several hundred pounds in forming meadows of this kind, without any allowance from their landlords; than which, a more clear demonstration

stration of the great utility of floating, in my opinion, cannot be given.

Mr. SMITH, in a late publication, has given us a specimen of the productiveness of these meadows, which proves that the instance which I have placed before the reader is by no means a solitary one; and as the detail with which he has favoured us is judiciously stated, and calculated not only to stimulate to adoption, but to throw light upon the subject, I shall beg leave here to insert it. The scene lies in the meadows of Mr. BECK, who appears to be a very spirited and intelligent practical farmer at Lexham, in the county of Norfolk.

Mr. S. says, page 115: “ March 23,
“ twelve acres of the bed-work were be-

“ gun to be fed with 201 ewes and 221
 “ lambs ; they were continued on the
 “ ground till the 10th of May. April the
 “ ninth, eight acres of the catch-work part
 “ were stocked with sixteen cows until the
 “ same time, taken into the yard by night,
 “ and fed with hay cut from the watered
 “ mead the preceding year, when the whole
 “ was re-floated for a few days, and shut up
 “ for mowing. Mr. BECK omitted no op-
 “ portunity of applying the water immedi-
 “ ately, as each part sufficient for the pur-
 “ pose could be fed, and the stock kept
 “ from it by hurdles ; and by this manage-
 “ ment the early-fed parts were stocked a
 “ second time before they were shut for
 “ mowing at the period above stated.”

If the spring-feed of the above num-
 ber of sheep and lambs be estimated
 at

at 12s. 6d. per week for seven weeks, it will be worth, per acre, 4l. 7s. 6d.

And the hay at two tons ditto, at the low price of 2l. 10s. each, 5l.

The aftermath or autumn-feed, at 1l. 10s.

It makes the crop worth 10l. 17s. 6d. per acre.

But it must be remarked that the crop, on account of the recent removal of the soil occasioning the destruction of much grass, was not so productive; and that the future crops will, for some years, continue to increase.

Mr. SMITH likewise says, “ I have
 “ heard that Mr. RICKWOOD’s watered
 “ mead of thirty acres (at Longleat I
 “ suppose) enables him to maintain 600
 “ breeding

“ breeding ewes in the spring; that half
 “ an acre of grass at that season is ca-
 “ pable of supporting 1000 sheep for a
 “ day.”

In these instances, the dairyman will see a variety of enticements hung out for the sheep-farmer, but nothing peculiarly attractive to himself. But I can assure the dairy-farmer, from what I have seen again and again, that no cultivator of land is more highly favoured by this practice than he himself may be. Indeed, every man who keeps live stock and grass-eating stock, ought to have a floated meadow: and, as one of my principal inducements to write, was the hope that my book would find its way into Ireland and into America, I beg permission to inform the occupiers of land in both these countries,

tries, that, whatever their stock may be, they will find the English method of floating highly worthy of their attention and imitation.

REVIEW

OF

Mr. Davis's Account of Watering.

BEFORE I proceed to make my Observations on certain parts of Mr. BOSWELL's Mr. YOUNG's, and Mr. SMITH's Treatises on Watering, which appear to me to be at variance with the true practice, and which will necessarily be rather numerous; I shall take the liberty of pointing out a few errors, which I have discovered in Mr. MARSHALL's account of the art.

Mr.

Mr. DAVIS, in his Agricultural Survey of Wiltshire, in describing what he calls flowing meadows, says, p. 33, “ It is usual to make the ridges thirty or forty feet wide, or, if water is abundant, perhaps sixty feet.”

This, I must venture to say, is a fundamental mistake, and shews that Mr. DAVIS is not so completely master of this art as he seems to be of almost every other branch of husbandry. It is, in other words, saying, that the more water there is, the less is used : or, where water is not abundant, use it freely, strain or sift it only over narrow beds ; but where it is abundant, make the most of it ; strain or sift it over wide beds, and detain it twice as long in the meadow as you do in the other case.

Where

Where water is abundant, I insist upon it that no ridge should be made sixty feet wide; none should be wider in this case, than twenty-four feet.

P. 37, Mr. D. says, "In autumn watering, if water can be commanded in plenty, the rule is to give it a thorough good soaking at first."

Mr. D. could not have used a more improper word, in this instance, than that of soaking, which is by no means an essential part of the system, in autumn and winter. Soaking, I grant, is an unavoidable, but it is, at the same time, an injurious attendant on the practice in the cold season. Why do Mr. DAVIS, Mr. MARSHALL, and Mr. BOSWELL, lay so much stress upon the good effects of an absor-

bent bottom in watering ; but merely because such a sub-soil is soonest free from the chilling effects of soaking water. I cannot think it necessary or favourable to vegetation, that the land under this process should, during the winter months, imbibe even one drop of water more than upland imbibes ; and I am persuaded, that if a floated meadow could receive its usual manure and shelter, without the water penetrating deeper than the surface, that the herbage would be more valuable than it is at present.

Let the reader turn his eyes to the meadows in the immediate vicinity of London, which are dunged every year, and he will find the crops of those meadows equally early, equally luxuriant, and probably more nutritive than those of the
 best

best watered meadows; and yet these meadows never derive any benefit from such a "thorough good soaking," as is recommended by Mr. DAVIS.

"This first soaking," Mr. D. afterwards says, "is to make the land sink, "and pitch close together." How land that has been compressed for several weeks by the heavy treading of cattle, can be made to sink still closer together, by means of water thrown over it, I cannot conceive. If Mr. DAVIS had said that water was used more freely in autumn than at other times, in order to collect as much mud as possible, I should perfectly have coincided with him in opinion.

Mr. D., in the same page, says, "when the water is taken off, then the works are
 269 G 2 made

“ made as dry as possible, to encourage
“ the growth of the grass.”

But it will be found, that the grass will seldom grow at this season when deprived of the shelter which is afforded by the covering of the water ; and if the weather is not mild, it will often shrink and lose ground.

Mr. DAVIS again adds, “ While the
“ grass grows freely, a fresh watering is
“ not wanted, but as soon as it flags, the
“ watering may be repeated for a few days
“ at a time.”

Here Mr. D. appears to me, to fall into the common error, of attributing the very essence of this practice to a mere wetting, or, according to Mr. BOSWELL,

p. 32,

p. 32, to a “refreshing of the land with
“water.”

These two last quotations, it will be observed, contradict each other; for in the first instance, the land is made dry to encourage the growth of the grass, and in the second, it is made wet for the same purpose: but I have not introduced them from the captious motive of exhibiting an inconsistency in the words of a superior agricultural writer, but, because I think they may materially affect the practice: for, although the process of watering has that alternacy which Mr. D. has justly remarked, yet this change from wet to dry, and from dry to wet, is not made, I presume to say, for those reasons assigned by Mr. DAVIS. In the former case, the land is made dry to give it air, to prevent
the

the rotting of the roots of the grass, and to hinder the generating of that scum which would soon destroy every blade ; and in the second instance, the water is thrown over again, to collect mud, and to shelter the land.

REVIEW

OF

*Mr. Marshall's Account of
Irrigation.*

MR. MARSHALL, in his Rural Economy of the Midland Counties, in describing watered meadows, vol. 1. page 226, says, “ The warmth communicated by running
“ water to the grass it flows over, is the
best

“ best account that the most enlightened
 “ in the art can give of its good effects.”

Warmth communicated by running water to the grass of floated meadows, cannot, I am confident, be the true cause of their fertility, for the following, amongst other reasons:—In the months of May and June, the grass upon floated meadows grows more rapidly than at any other time, and yet the water is not then upon the meadows. What is absent, therefore, cannot operate as a present agent; or, the warmth of the water can have no effect upon the grass after the removal of the water; for Mr. MARSHALL will not say that the warmth, which he has introduced, will remain with the land for the space of two months. We must, therefore, look to the agency of something which
 is

is communicated to the land by the running water, and which remains with it as a permanent power after the water is withdrawn.

P. 228, Mr. M. says, “ It being impossible in practice, to render the sheet of water throughout of a uniform depth or thickness.”

If Mr. M. when he visited and resided sometime in Gloucestershire, for the purpose of investigating the husbandry of that part of the kingdom, had seen the floated meadows in the vicinity of Cirencester, (and it is truly surprising to me, that he could reside twelve months so near them, without either seeing them, or hearing of them) he would not have made the above remark, for he would there have
seen

seen hundreds of acres, in the old meadows, under sheets of running-water, never perceptibly varying half an inch in depth.

P. 235, Mr. M. says, “ Mr. BAKEWELL studied the art of watering, in the principal scene of business, the West of England, under Mr. BOSWELL.”

That “ the West of England is the principal scene of business” in this way, I will not allow; till Mr. MARSHALL has produced a specimen of greater fertility, arising from the Dorsetshire method of watering, than that which I have given as the effect of my favourite mode.

A gentleman of Yorkshire, who visited Mr. BOSWELL's place of residence pur-

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posely

posely to see the Dorsetshire method of floating, informed me, that the West of England was far from being “the principal scene of business” in this agricultural department. And this gentleman was a very unprejudiced and a very competent judge in the matter.

Mr. M. afterwards says “that watering “is not merely a stimulus, or force, but “communicates real nutriment to the “herbage.”

I am very happy to find Mr. M. here, relinquishing his very untenable position, that every thing in this practice, is to be attributed to “warmth, communicated “by the running-water.”

But, I trust, when this subject has been
more

more amply discussed, and the practice more generally adopted, that the more substantial ground of real nutriment in substance derived from the water, will be universally received. For it has been ascertained, by a variety of experiments, that all water contains earth and other matter; that the purest rain-water has likewise its oleaginous particles, and all oil contains coal, which is an essential ingredient in the food of all vegetables. Spring-water, it has also been ascertained, is more nutritious to plants than rain-water; and river-water than spring-water. See Mr. KIRWAN's very perspicuous Treatise on Manures.

Mr. MARSHALL, in his Rural Economy of the Southern Counties, v. 2, p. 333, speaking of the watered meadows near

Salisbury, observes, " That the soil is
 " mostly thrown into ridge and furrow ;
 " with DEEP floating trenches on the tops
 " of all the ridges, whether long or short."
 And again, p. 338, " large DEEP floating
 " trenches on the ridges; narrow drains
 " in the furrows."

This shews a great defect in the Wiltshire plan, if Mr. MARSHALL's account be correct. These trenches, or floating-gutters, ought never to be made deep, nor ought the drains ever to be made narrow, when their corresponding trenches are large, unless there is fall enough to make them compensate in depth what they are deficient in width; for the water must not be suffered to stagnate.

P. 333, Mr. M. asks, " Does the water
 " retained

“retained in these deep trenches, convey nutriment to the soil and substrata? or give them more readily a plenitude of moisture?”

To this question, every practical floater will reply, that the nutriment should be conveyed to the surface only; and that the soil, and substrata, are always wet enough, without the soaking of this injudiciously retained water.

REVIEW

REVIEW

OF

*Mr. Boswell's Treatise on watering
Meadows.*

MR. BOSWELL, p. 6, commences with, and founds the chief structure of his Treatise upon, what appears to me, a false principle, the attributing the excellence of floating, more to the nature of the land floated, than to the quality of the water used. In the scale of productiveness, he gives the precedence to gravelly, or sandy soils; in the second rank he places boggy and rushy-land; and in the last class, strong, cold, clay-land. For a few years, I grant, the difference of soil may have a considerable effect; but after a continuance
of

of floating, good water will form for itself a good new soil. I could shew Mr. B. all these sorts of land upon one and the same stream, under the same management, and each equally productive. I could shew him in the same floated meadow, gravelly, boggy, and clay-land, without any apparent difference in the crop.

The floaters in Gloucestershire, when consulted on the practicability and probable advantage of the art, in a situation which they are unacquainted with, never ask, or care, what the land is, provided there is a copious stream, and a quick descent in the meadow. Give them plenty of water that is enriched with the wash of a village, or of a fertile country, and fall enough to keep every drop in motion, and they will pledge themselves to make every
acre

acre of land, so circumstanced, worth four pounds a year.

P. 10, Mr. B, says, he “ Knows a considerable tract of land, and one meadow in particular, that is watered by springs issuing immediately out of a fine springy gravel, without any advantage from great towns, &c. being situated but a small distance below the head of the rivulet, and the rivulet itself is fed all the way by springs rising out of its bed as clear as crystal. Whether,” he adds, “ It is from the heat of the springs, or whether the friction by the water running over the soil, raises a certain degree of warmth, favorable to vegetation, or from whatever cause it arises, the fecundity of this water is beyond conception.”

This

This, and a like assertion of Mr. BOSWELL'S, p. 14, supported by similar expressions of other writers, has given, to those who are unacquainted with the practice, too great reason to expect the most extraordinary effects, from this use of the pure elementary fluid, and to esteem it, not as a *vehicle* or *source* of manure, but *as a manure of itself*. This idea I am sorry to see corroborated by Mr. BAILEY in his Treatise on Manures; when he says, "In "floating, water is used *as a manure*."

Mr. BOSWELL'S notion of the efficacy of the friction of the water, arises, I presume, from his observing that those parts of a meadow are invariably the richest, on which the water flows with the greatest velocity. This inequality of fertility, however, may be accounted for, on more

substantial grounds, than on the principle of warmth communicated by friction; for where the water flows with rapidity, you of course use or filter twice as much as you do, on the same quantity of surface, where it moves sluggishly; and if there is any thing substantial to be thus collected from the water, two tons of water will doubtless afford more substance, or sediment, than one can give.

Mr. B., in continuation, adds, p. 11,
 “ And although the water is so exceeding
 “ clear, yet upon its being thrown over
 “ the land, only for a few days in warm
 “ weather, by dribbling through the grass,
 “ so thick a scum will arise, and adhere
 “ to the blades of the grass, as will be
 “ equal to a considerable quantity of ma-
 “ nure spread over the land, and (it may
 “ be

“ be presumed from the effects) still more
 “ enriching.”

Mr. B., I believe, is the only person who has attentively considered this subject, that will allow this scum, in any instance, to be enriching to land. In every example that I have seen, or heard of, it has been found *poisonous* to the grass. If scum were conducive to fertility in a floated meadow, every flat or low part of the beds, where the water runs slow, and where the scum is generated in the greatest abundance, would invariably be the most fertile; but this, experience tells us, is never the case. This scum appears to me to be a mere collection of small bubbles of simple water, which adheres to the blades of the grass. Mr. BOSWELL should

make a proper distinction between scum and sediment,

P. 28, Mr. B. says, "Every inequality in water meadows, should either be levelled down, or filled up."

This direction ought to be regulated by the expense, which is the most powerful enemy that this practice has to contend with; for it often happens that a twentieth part of a meadow may cost more, in being levelled down to the general surface, than all the other parts in being effectually floated. In every instruction that I give, I shall cautiously avoid the rock of expense. I know many farmers who wish to preserve a small eminence in their meadow, for the cattle to resort to, in a rainy

rainy night, both to prevent a destructive-treading of the grass, and to accommodate the cattle with dry lying.

P. 29, Mr. B. says, “ The water having
 “ been so very lately strained over the
 “ ground, it is supposed by the water-
 “ men to be not so enriching as it was
 “ before it was used.”

This is not a mere supposition of the watermen, but is a principle in the Art of Floating which ought, upon every occasion, to be peremptorily insisted on, although it may be at variance with some parts of Mr. BOSWELL'S System. Indeed, not only is the bed which receives the first water, more fertile than those that have the second or third use of it, but the upper part of every bed is richer
 than

than the lower part, especially where it is made more than five yards wide. Of this, the cattle, when turned into the meadow, will give an incontrovertible proof, by leaving the grass on the lower part untouched, till that on the upper part, which is always more luxuriant, is entirely eaten off.

P. 31, “ The larger the body of water
 “ that can be brought upon very boggy
 “ land, the better ; its weight and strength
 “ will greatly assist in compressing the
 “ soil.”

I agree with Mr. BOSWELL, that it is very advantageous to boggy land, to have a large body of water brought upon it when it is first formed for floating ; for the more strong and rude the current, the
 more

more mud, sand, or gravel, will be carried upon the meadow. Matter of this kind, however coarse it may be, will greatly improve the land, by giving it that stability and soundness which are so peculiarly requisite to a loose boggy surface. I cannot however conceive that boggy land, though Mr. B. has frequently repeated it, can be compressed by a sheet of water; for, to me, it always appears to be dilated by water, as a sponge is; and every person who has drained a bog, has found, that it will sink considerably when the water, which generated it, has been drawn from it.

P. 54, Mr. B., speaking of the Dorsetshire Watermen, says, “ Besides, though
 “ many workmen may be met with ex-
 “ ceeding clever in the execution, and
 “ even

“ even in the direction of the work, yet,
 “ in general, so confused are their ideas,
 “ that they are unintelligible, and their
 “ mode of directing unsatisfactory, being
 “ mostly conducted without a plan, and
 “ executed as incidental circumstances
 “ arise ; still blundering on with the work
 “ they have begun, many trenches and
 “ drains are cut improperly. The result
 “ of all which is, an incomplete perform-
 “ ance at first, and every year after emen-
 “ dations and alterations follow ; some
 “ for the better, but many for the worse,
 “ to the great disfiguring of the meadow ;
 “ extraordinary expense to the owner, as
 “ well as betraying the ignorance, or want
 “ of skill in the undertaker.”

Whether this charge of incapacity be
 applicable or not to the Dorsetshire water-
 men,

men, I cannot say, but that it does not apply to the Gloucestershire floaters, I have no hesitation in affirming. I am persuaded that any one of these floaters, who has been regularly brought up in the practice, would give a clearer idea of it, in one hour's conversation on the spot, than Mr. B. or I can by writing volumes on the subject. Indeed, I have scarcely ever ventured to give one positive direction relative to the art, either in my preceding Treatises or the present, without first consulting these practical men on its propriety. On this ground, I have expressed myself with the more confidence, conscious that I have advisers who have executed the work, and seen its effects, under almost every variety of circumstances that can occur in this island; for I can, with no small degree of satisfaction, say, that I have been instrumental in

sending nearly twenty of these skilful operators into various parts of Wales and Scotland, as well as England, and hope to receive further commissions for this purpose.

P. 65, Mr. B. says, "The more surface there is in the panes, the more water is required to flood them;" and again, p. 25 and 75, "the width of the trenches that convey the water varies according to the breadth of the panes."

By pane, Mr. B. means, what I have called a bed, and by trench, a floating-gutter. If he will re-consider the above assertions, he will immediately discover, that the *breadth* of the pane, or bed, by no means determines the *width* of the trench or gutter, or the quantity of water that is required; for a bed of only one foot width will consume as much water as
a bed

a bed of thirty feet, provided the water flows in both cases with the same depth and velocity. The quantity of water will depend, in a certain degree, upon the *length* of the bed, but not upon its *breadth*. A broad bed will use the water a longer time, but will not take more water.

P. 85, "In erecting weirs, &c." Mr. B. says, "Clay must always be avoided; " it is worse than the common soil."

Clay has almost invariably been used for this purpose in Gloucestershire, and is found to answer very well, where it is not outside work, and exposed to the frost.

P. 98, Mr. B. says, "The trenches, " drains, &c. will, if the land is pretty " firm, by thus repairing, do their offices

“ three years ; otherwise not more than
 “ two.”

I cannot conceive what defect it is, in the constructing of the Dorsetshire trenches and drains, that makes them thus liable to fail in two or three years ; for all the ditches and works formed according to the Gloucestershire mode, will last for ages, with only a little repairing after the treading of the heavy cattle.

P. 104, “ When the water is low, keep
 “ it together, rather using it to water only
 “ two or three trenches well, than letting
 “ it run down to the tails of many, which
 “ rots the ground there, and does no good
 “ at any other part.”

This is an excellent rule of Mr. Bos-
 WELL's ; and if the other parts of his book
 were

were consonant with this, the difference of our plans would have been too inconsiderable to have called forth this particular notice.

P. 106, “ About a week before the
 “ grass is to be mown, let the water into
 “ it, for about twenty-four hours, it will
 “ make the ground moist at the bottom,
 “ the scythe will go through it easier, and
 “ it will be mown the closer for it.”

This is a very improper direction on several accounts: the water thus let in, though it be ever so clear, will leave a filthy substance on the grass very injurious to the hay; it will make the ground too soft to bear the carriages loaded with the hay; and will give a wetness to the land, which will occasion the hay to be at least a day longer in making than it would
 have

have been, if the land had been perfectly dry, which in some seasons, may not only injure, but spoil the whole crop.

P. 106, “ The feeding the meadows
 “ about Lady-day, is called Spring-feed-
 “ ing, and should never be done by any
 “ other cattle, besides sheep and calves.”

A dairy-farmer will totally disregard this restriction; convinced, by experience, that if the meadow is laid dry before the cattle are admitted, the harm that can arise from their treading, is by no means worthy of comparison with the great advantage which a hard-wintered stock of cows will derive from such grass, at such a season.

P. 112, “ In this manner the after-grass
 “ will, in a mild season, last the cattle till
 “ Christmas.”

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I answer, that the after-grass should never be left uneaten till Christmas; the meadow should be prepared to receive the water at the beginning of November.

In the above page, Mr. B. says, "The after-grass should not be fed by sheep. It will infallibly rot them, in this county."

The after-grass, in the generality of floated meadows which I have seen, will not endanger the soundness of the sheep which feed upon it, unless water has been thrown over the meadow in summer. I had frequently been told, that watering even for one day in SUMMER, would render any meadow an unsafe pasture for sheep in the autumn. To this assertion I did not give credit till a few years ago, when I had an opportunity of ascertaining the
fact,

fact, in a meadow, which I rented purposely for the sake of making this, and other experiments.

P. 114, Mr. B. begins his fifteenth chapter, in which he confines himself to a review of my first publication on watering ; and for the observations which he has there made, I am so far from thinking his apology necessary, that I wish, instead of insinuations, he had proceeded to direct animadversions, or open contradictions, where he thought me erroneous. This appears to me, the mode best calculated to bring forward and establish the truth ; which, on all occasions, great or small, is too valuable to be sacrificed to the complaisance of scribblers.

In my Treatise which was published in the year 1789, desirous of shewing, what
I still

I still find it necessary to contend for, that the effects of *spring-water* are very inferior to those of *thick* or *muddy water*, I gave two instances of meadows, that were watered from springs which arose in the grounds themselves; and asserted, that though the crops in these meadows were early and plentiful, yet they were *not of a good quality*, and that the *land* remained unimproved after many years watering.

To this my doctrine, Mr. BOSWELL opposes “contrary effects from a stream, “very near the spring-head, as clear as “crystal;” and unfortunately this opposition, and his attempted confirmation of it, Page 115, has been transcribed into the *Encyclopædia Britannica*, and has given birth to the following more dangerous remark of the editors of that valuable book of reference:—“From this passage,”

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they say, “ the latter part of which is not
 “ very intelligible, we might conclude,
 “ that Mr. BOSWELL prefers clear, to mud-
 “ dy-water, for overflowing meadows.”

Mr. BOSWELL certainly does not intend to say so much as is here intimated. By “ contrary effects,” he cannot mean to say, that the converse of my whole proposition is true. He must only wish to say, that he knows an instance of a meadow, floated by clear-water, producing crops of a good quality, and having its land improved by this water. This is undoubtedly saying a great deal too much, especially when opposed to the effects of muddy-water; for (to say nothing of the inequality of the crops, if watering were entirely to cease, Mr. B. would find the staple of his land neither stronger nor richer than it was, when this clear-
 water

water was first brought over it. But, discontinue floating on a meadow, which has had the advantage of muddy-water, and its soil will be found to have received an addition, that will prove a permanent amelioration. Examine every effect of these two kinds of water, and in no single instance will it be found, that the former is preferable to the latter; but if there be any valuable stimulus, force, shelter, or encouragement, in clear-water---muddy-water likewise has *all these*, and gives that strength and power besides, which are always necessary to render the crop, that is produced, *good in quality*. Perhaps the introduction of the following facts, may serve, in some measure, to illustrate what I have asserted on this point:---About ten years ago, Mr. RANDAL, from South Cerney, entered upon a farm at Quenington, the property of Mr. HICKS BEACH, in the

neighbourhood of the well-known stream of Bibury, where he had the satisfaction of finding a large meadow already watered; but he soon found, likewise, that its grass, and the hay made from it, were by no means so nutritious as he had elsewhere seen them. Certain of the improvement that might be made, from this copious stream, at least in the quality of the grass, he proceeded to make the following amendments:—wherever he found a wide bed, he divided it into two; he increased the width of his conductor, in order to admit more water, and sunk the bottom of it as low as the bottom of the stream, to draw in the more mud, which he took care frequently to disturb, with iron-rakes, made for the purpose; and by these means, he informed me, he improved the meadow to twice its former value. Not content with this, he contrived, the year follow-

following, to carry a part of the stream through his farm-yard, which was constantly filled with a large stock of cattle and pigs, and with this water he floated nearly an acre of this meadow. The effect of this last process, I went purposely to see, and found, at the beginning of the month of April, that the ewes and lambs had been turned into the meadow two days, where they had shewn a nice discrimination between the grass upon the above acre, and that on the other parts of the meadow: they had eaten the grass, where this foul water had run, to the very roots, and had walked over all the other parts, almost without tasting, though the grass was luxuriant and fine, and the land in a very improved state. This convinced me, that one mouthful of the grass on the former part, was almost as valuable as two
of

of the latter, and that the quality of the grass will always be as the water.

In my treatise, I had mentioned a temporary wear, or dam; and Mr. B. has said, p. 116, that such a dam “would not, in Dorsetshire resist the force of the water five hours, in streams that are not more than three or four yards wide;” and reprobated such dams for other following reasons.

By a *temporary wear or dam*, I did not mean one of any particular construction, either weak or strong; but, according to the common meaning of the word *temporary*, such a wear or dam, as might stop the course of the water whenever occasion required. Mr. B. may see that the wear which I now recommend, and have given
a slight

a slight sketch of in plate 2, though more simple, and far less expensive, is equally strong with that which he has taken up fifteen pages in describing.

In the direction which I gave for watering in the month of February, I mentioned the danger to be apprehended from the poisonous effects of scum, and the destructive severity of a frosty night, and pointed out the usual and skilful method of the Gloucestershire Floaters to avoid the injury from either quarter; which was to take the water off in the day, and to turn it over again at night. This direction Mr. B. seems to think not only extraordinary and unnecessary, but, for several reasons impracticable. "Taking the water off," says he, p. 117, "and turning it over at night in frosty weather, where

“ where there are 300 acres to water
 “ by one stream, appears to be a very
 “ extraordinary direction, and in the
 “ country where this treatise is written,
 would be quite impracticable.”

It was shewn in several parts of my book, that these 300 acres were divided into separate meadows; which lay in succession, on both sides of a rapid stream. It was there likewise intimated, that each meadow (whether the whole, or a part of it was watered at one time) quickly threw back the water into the stream, and that the proprietors of the lower meadows did not suffer any one of the meadows above them, to take the whole of the stream, or (as they style it) the whole of the best water; and also, that less water is now required, than in an earlier part of winter. Meadows, therefore, thus situated and
 circumstanced,

circumstanced, are almost independent of each other, with respect to the quantity of water; and the number of acres will be no real impediment to the adoption of the above process.

Mr. B. afterwards adds, “ when the
 “ water is turned out of one meadow, it is
 “ often half, and sometimes a whole day,
 “ before it rises high enough to flow suffi-
 “ ciently over another meadow, to spread
 “ it properly over all the works.”

This shews, that the Dorsetshire meadows are constructed too much upon the dead-level plan; and that the water is extended too far. I do not, however, see how this is reconcileable with what Mr. B. asserted in the preceding page, that the
 “ force of these streams was so great, as
 “ not to be resisted, for a few hours, by
 M “ temporary

“temporary weirs or dams.” Mr. B. must have confounded two streams, for such opposite effects cannot be attributed to one and the same current. A meadow formed on the plan which I recommend, may be freed from the water in ten minutes; and, if not larger than seven or eight acres, will be completely overflowed in less than half an hour. This time in overflowing will, of course, depend on the greater or less degree of descent in the meadow.

Mr. B. then says, “The sun’s warmth
“is seldom found strong enough to have
“any effect upon the water in the month
“of February. It is not uncommon in
“that month to have the water kept upon
“the meadows a fortnight, or more.”

In some seasons, I allow, the warmth
of

of the sun is not very strong in the month of February; in others, however, it will be found too powerful an agent in the generating of scum. The above rule was given to be observed, when frosty nights prevail, and in such weather, the days are generally clear, and the sun has considerable effect. It appears from other parts of his book, that Mr. B. has not so great a dread of scum, as is entertained by other persons, or he would not have allowed the water to remain on a meadow “ a fortnight or more” towards the end of the month of February.

“ Frosts of one night, often fix the hatches in the wears so fast, that they cannot be moved till the frost breaks.”

This obstruction, to the direction above given, namely, “ taking the water off in

“ the day, and turning it over at night,” does not often occur in Gloucestershire, for the weirs are there seldom made with hatches; but are generally constructed in the simple way, which I shall hereafter describe. This shews one advantage that the latter has over the Dorsetshire dam, that a part of it can always be removed at pleasure, and the water sunk or raised as required. When the frost, however, has given a sheet of ice to the meadow, the above rule becomes unnecessary, and it is then the safer way to discontinue floating; for a severe frost, when the water is kept running, often occasions great unevenness in the surface of the beds.

The next remark which Mr. B. makes upon the contents of my first pamphlet, is one for which I sincerely return him thanks: it is the correction of a real error
which

which I had fallen into, by taking my estimate of the expenses of forming one of these meadows from two improper instances, which had lately occurred, and in both which nature herself had already nearly laid out the land to the hand of the floater. I there ventured to fix the probable expense of thus forming a meadow; and have since discovered, that I had stated it very much too low; and that it cannot be predetermined, but must depend upon a variety of attendant circumstances; though, in general, it will be between two and five pounds *per acre*.

P. 119, Mr. B., comparing the value of the Dorsetshire meadows, with that of the Gloucestershire, says, “ the spring-feed
 “ is on an average let for about ten shil-
 “ lings an acre. If situated near towns,
 “ butchers will give more. The after-
 “ math

“ math from ten to fifteen shillings;
 “ rarely more. The value of the grass
 “ (uncut) for hay, differs exceedingly;
 “ the herbage, quantity, quality, situa-
 “ tion, and demand for it, occasions a
 “ difference from thirty shillings to three
 “ pounds an acre. Water-meadow lands
 “ let, unless in very particular situations,
 “ from five and twenty to five and forty
 “ shillings per acre, detached from any
 “ other land; and then the occupier has
 “ the liberty to sell the hay.”

From these specimens of the produce
 and value of the Dorsetshire meadows,
 their inferiority appears manifest and
 considerable. “ This statement,” says
 Mr. B., “ compared with that in the
 “ pamphlet before referred to, will plainly
 “ shew the vast difference in the nature
 “ and value of the soils in their unim-
 “ proved state.”

I am

I am by no means willing, however, to concede to Mr. B., that the great superiority of the Gloucestershire meadows over the Dorsetshire, can arise from the difference that subsisted in the quality of the soils before they were floated; for the soil of the best of our meadows, is, in general, of that very kind which Mr. B. seems almost to contemn; either strong clay or boggy soil. The best meadow in the parish to which I allude, is entirely a strong cold clay; and the hay that is cut from this meadow, will fat an ox as soon as the best upland hay in the neighbourhood, though it is an excellent grazing county. This meadow is the best in the parish, merely, I presume to say, because it is the highest upon the stream, and being well attended to, is the first that receives the water, after it is enriched by the wash of the streets, &c., of the town of Cirencester.

Cirencester. There is, I ought to observe, another parish intervening between South Cerney and Cirencester, that has several large meadows, which, when they have due attention paid to them, are still more fertile than that above-mentioned, and are perhaps, at this time, amongst the best floated meadows in the kingdom.

REMARKS

REMARKS

ON

Mr. Young's Instructions for forming new Watered-meads.

I HAVE lately met with a sketch of the art of forming new watered-meads in Mr. YOUNG'S Farmer's Calendar; and as I find therein some directions, which appear to me not only erroneous, but in direct opposition to the most valuable part of the practice, I shall take the liberty of pointing them out, and of submitting certain reasons why I think them reprehensible.

Mr. YOUNG, unfortunately, has seen the effects of watering in warmer climates than that of England; he has seen, likewise, that mischief-making meadow at Long-
 N leaf;

leat; he has read the faulty part of Mr. BOSWELL'S book, and hence, mistaking the practice in its principles, has issued his instructions accordingly, and has formed all his positions, and his plates, in entire conformity to that very inadequate plan called Catch-work.

I shall pass over Mr. YOUNG'S ten first directions, as they are too inoffensive to be meddled with; but his eleventh instruction is of a very different cast: for in this he says (page 303) “ here the operator
 “ must be instructed, that the lands usu-
 “ ally chosen for the first operations, are
 “ just those that ought to be the last, *viz.* :
 “ the low flat meadows by the river.
 “ These are by far the most expensive to
 “ irrigate, and when done, unless very
 “ well executed indeed, yield the worst
 “ hay.”

Now

Now this is a sentence which involves a variety of error and fallacy; and as it comes from a veteran in agriculture, and almost *ex cathedra*, and as every error therein contained is, therefore, pregnant with double danger, it ought to be opposed with double freedom and firmness: for if the advice of Mr. YOUNG, in this one sentence, were to be generally entertained and acted upon, it would miserably circumscribe, cripple, and degrade this profitable branch of husbandry. Mr. YOUNG here teaches the agriculturist to water by units, when he has it in his power to float by tens, or perhaps by hundreds; he sends him about in pursuit of pence, when pounds lie before him; and he encourages that propensity, which we find already too prevalent in many, to play little tricks with a little limped water on the sides of hills, when they have it in

N 2

their

their power to perform acts of national benefit “on the low flat meadows near “the river.”

If Mr. Y. will examine the course of a variety of brooks, and rivulets, and streams, he will discover that very few of them can be used, to any extent worth notice, before they arrive at “the low flat meadows:” and here he will find a happy union of streams, and as the water increases in quantity, he may always reckon upon a proportional improvement in its manuring quality; for I am glad to find, from Mr. YOUNG’s own words, that he does at last allow water to have a *manuring quality*. See page 314.

Mr. YOUNG grants that it is USUAL to give the preference to the low flat meadows, for the purposes of irrigation; and
 who,

who, let me ask, has a right to alter what is usual and extensively profitable, without giving convincing reasons for the innovation? Mr. YOUNG has indeed offered two assertions, in the shape and in the stead of reasons; but they are such as tend to overturn, rather than support, his first bold proposition:—"These meadows," he says, "are by far the most expensive to irrigate; and unless very well executed indeed, yield the worst hay!" His assertion respecting the expense in fact affirms, that it is far more expensive to use water at hand, than to carry it to a distant part; or more expensive to convey water five yards, than to convey it five hundred yards; for the distribution of the water upon the surface will probably be the same in both cases. Besides, Mr. YOUNG should here be told, that water conveyed five hundred yards, at the rate of fall which he allows

it,

it, (*viz.*: from twelve to twenty inches in a mile), will suffer a very material deterioration in its quality, and a very considerable diminution in its quantity, not to mention the injury from soakage, and other inconveniences, which the land will sustain through which the water passes. He probably never yet felt the expense of cutting a wide conductor, five hundred yards in extent; of making good the banks; of erecting bridges, and of carting away the soil. I have seen repeated instances of all these charges having been incurred; but I never knew them submitted to without heavy complaints. The expense of merely distributing the water upon the meadow, if the land is cut as freely as it ought to be, is always found heavy enough, without looking out for extraordinary occasions of expenditure.

The

The other position of Mr. YOUNG, that “the low flat meadows near the river produce the worst hay,” that is, worse than bogs, heaths, and ling-moors under irrigation, is an assertion made without consideration, and does not deserve any thing like a formal refutation. “These low flat meadows,” he says, “are already too good to be irrigated;” and yet, it seems, “they produce the worst hay,” when they have the benefit of irrigation.

Under the influence of, or rather run away with, by the above opinions, Mr. YOUNG ventures to censure BROOKES, a very experienced floater, whom I sent, a few years ago, to Mr. GALWEY, of Tofts, in Norfolk, for having watered the *lowest* land of Mr. GALWEY and other gentlemen, when he might have watered the *highest*; or, “for using a small quantity
“ of

“ of water to *some* advantage, when the
 “ same might have been used elsewhere
 “ to *the greatest.*” Here I charge Mr. Y.
 with misrepresentation:—BROOKES did
 not use “ *some water*” on Mr. GALWEY’s
 lowest land, when the same might have
 been used elsewhere. He used *two* streams
 instead of one, on the lowest land; he
 used one stream which could not be used
 on higher ground; a stream which the
 unerring spirit-level, in the hands of two
 skilful persons had pronounced to lie too
 low to be used on this said meadow. For
 Mr. GALWEY informed me, when I visited
 him at Tofts purposely to view this mea-
 dow, that he was astonished to see what
 BROOKES had done, when he found the
 water of this stream flowing into, and
 working well upon his land, after it had
 been condemned as unserviceable, by two
 persons who had nicely examined it with
 “ a spirit-

a spirit-level. And yet BROOKES is styled, by Mr. YOUNG, an “ ignorant fellow, and “ a gross blunderer,” for having presumption (or rather skill) enough, to draw out the works of these thirteen acres, “ without the assistance of a spirit-level;” and for having used “ TWO streams instead of “ one.” Mr. BEVAN, of Riddlesworth, (than whom I believe there cannot be a more dispassionate and able judge in agricultural matters), saw these blunders of BROOKES, and immediately engaged him to alter some watered meadows; and wished, he told me, to contract with him for the whole year, or longer. This man, I know had, before this, exhibited similar proofs of ignorance and blundering; and therefore I highly recommended him to Mr. GALWEY: and he is now committing acts of the same kind upon the land of Mr. DE-

NISON, at Ossington, in Nottinghamshire, upon the same recommendation.

I cannot help commending the spirit with which Mr. YOUNG chastises every thing that he supposes to be *contra artem* in husbandry; but I must be allowed to think, that the man who holds up his head as an instructor, should himself have first submitted to be instructed--should not be too high to ask the opinion of the lowest, especially in the manual parts of husbandry; nor too confident or precipitate to attend to, and to understand, the answers given him. I could not help smiling when I saw the liberty which Mr. YOUNG has taken, in his calendar, of lashing a man who knows more of Floating, in all its circumstances---in all its branches--and in all its bearings, than
Mr.

Mr. YOUNG, and all our worshipful company of agricultural book-makers taken in the gross.

I hope Mr. YOUNG will re-consider this point, and in his next edition will turn the eyes of his readers not UP but DOWN the stream, into the valley, where they will always find a confluence of streams, and where, in a rainy season, every ditch and every furrow, on each side of the valley, becomes a rivulet, which conveys its peculiar impregnations to the general mass, which will easily be made to roll, in abundant richness, over the surface of the adjoining meadows.

In the page above quoted, Mr YOUNG seems to make summer-watering a part of his system, and expresses himself in this extraordinary way:—" Though the river

“ may not afford plenty of water in sum-
 “ mer, or very dry years, yet it may
 “ abound in winter; and watering at that
 “ season alone is well worth the expense
 “ of all the necessary works in most cases.”
 I have tried summer-watering, and found
 that it had a too powerful tendency to
 make the meadow coarse. It will like-
 wise, in many instances, have the effect
 of rotting sheep, which feed upon grass
 thus encouraged.

Page 307. Mr. YOUNG says, “ All
 “ spaces that are level, or nearly level,
 “ should be ploughed on to lands or
 “ ridges eleven yards wide, and raised, if
 “ water be plentiful, three feet higher on
 “ the crown than in the furrow.”

Such a direction as this should not, I
 think, have been given to the farmer
 unaccom-

unaccompanied with a limitation; lest, when he has ridged up his land three *feet*, he should discover that he can raise the water only three *inches*. If the land intended for irrigation is greensward, I should never recommend the introduction of the plough; it is a great loss of time as well as of turf. "Spaces that are level," are brought into a form somewhat resembling a ridge of land, with a very little trouble, and at a light expense, with the spade, and immediately become productive. I have attempted to give a representation of this imitation of a ridge, in Plate 1. Fig. 1.

Page 308. "Upon dry slopes, nothing
 " more is requisite than to cut trenches of
 " delivery, which operate by alternate
 " watering both as deliverers and as
 " drains, This is a point little under-
 " stood,"

“ stood,” says Mr. YOUNG, “ through
 “ several districts I have seen, and a very
 “ important one.”

No point or part of this practice, I maintain, can be an important one which recommends a five-times repeated use of the same water upon one and the same meadow, without admitting one drop of unstrained water to the lower departments. This is not quite consistent with Mr. YOUNG's concession, that water possesses a *manuring quality*; for the first use must take from the water a certain degree of its manuring quality, and, of course, less of this quality must remain for the second using, and still less for the third; and so on, till at length there remains nothing to be used, upon the lowest part of the meadow, but the pure simple element of water.

When

When Mr. Young says that catch-work is "a point little understood through several districts," he appears to me to have selected not quite the proper term to be used upon the occasion---he should have said *little esteemed* instead of little understood, for it must be understood in every district where watering is known---children can play at it, but men generally despise it. To catch water five times, by means of traps set at the ends of five dead-level ditches, is a very tame and tedious process; keeps the water too long soaking into and chilling the land, and increases that coarseness in the grass, which is an evil too apparent in the best formed meadows, and ought to be guarded against by every possible means. Mr. YOUNG, in the plate which he has given to illustrate this plan, has introduced the whole number of stops, as he calls them, but which
 are

are nothing less than flood-hatches, and not less in number than 40, the making and placing of which must amount to a large and very forbidding expense.

Page 310, Mr. YOUNG says, “ It is not
 “ uncommon, for want of such a plan of
 “ operation, (as the catch-work plan which
 he had just described) “ to see trenches
 “ of delivery accompanied by drains,
 “ which operate only as drains, and which
 “ carry away the water without any power
 “ of using it even a second time.”

What Mr. YOUNG here sees with regret, will continue to be viewed with pleasure by all who are fortunate enough to be able to apply this plan, and the results will shew to them, that this appearance which he condemns, is a genuine feature of the true system ; and that a second using of
 the

the water is a defect, and the mere offspring of necessity. It is better, indeed, whenever there is only water enough for one half, or for one-third of the land, to make two or three master-feeders, and to float the meadow at two or three turns, than to catch the water in order to use it twice or thrice. This is true when predicated of spring-water as well as of river-water; for all spring-water has its peculiar impregnations, which it will deposit when placed in a state of rest, and which will be absorbed, or will be otherwise separated from it, on its being filtered through a bed of grass. This separation may not be total, but it will be considerable, and consequently there will remain less of these impregnations to be separated upon a second use of the water, and of course the grasses so deprived will be proportionally less encouraged in their growth;

for it has been proved, not only by common experience, but by Mr. KIRWAN, and other eminent chemists, that water is not the sole food of plants; that water and earth, taken together, do not constitute the whole food of plants; but that they receive into their composition water, charcoal, oils, animal and vegetable substances, different earths, and salts; but Mr. KIRWAN, in his valuable little book on manures, speaks so directly and so decisively on the point for which I have been sometime contending, that I must beg the liberty of laying before my readers a copious extract or two.

In page 25, Mr. KIRWAN says, “ The
 “ agency of water in the process of vege-
 “ tation has never been doubted, though
 “ the manner in which it contributes to
 “ it has not, until of late, been distinctly
 perceived.

“ perceived. Dr. HALEs has shewn, that
 “ in the summer months a sun-flower,
 “ weighing three pounds avoirdupois,
 “ and watered regularly every day, passed
 “ through it, or perspired, twenty-two
 “ ounces each day; that is nearly half
 “ its weight. He also found that a cab-
 “ bage-plant, weighing one pound nine
 “ ounces, sometimes perspired one pound
 “ three ounces; but at a medium about
 “ half its weight. Doctor WOODWARD
 “ found that a sprig of spearmint, weigh-
 “ ing only twenty-eight ounces twenty-
 “ five grains, passed through it 3004
 “ grains in seventy-seven days, between
 “ July and October; that is, somewhat
 “ more than its own weight each day.
 “ He did more; for he found that in that
 “ space of time the plant increased seven-
 “ teen grains in weight, and yet had no
 “ other food but pure rain-water: but
 “ he also found that it increased more in

“ weight, when it lived on spring-water,
 “ and still more *when its food was Thames-*
 “ *water.* From whence” (says Mr. KIR-
 WAN) “ we may deduce that grasses and
 “ corn, during the time of their growth,
 “ absorb about one half of their weight
 “ of water each day, if the weather be
 “ favourable.”

Secondly, “ That the water they thus
 “ pass nourishes them merely as water,
 “ without taking any foreign substance
 “ into the account, for 3000 grains of
 “ rain-water, in Doctor WOODWARD’S
 “ experiment, afforded an increase of
 “ seventeen grains; whereas, by MAR-
 “ GRAAF’S experiments, 5760 grains of
 “ that water contain only one-third of a
 “ grain of earth. But,

Thirdly, “ It also follows, that water
 “ contributes still more to their nourish-
 “ ment

“ ment when it conveys to them earthy
 “ and saline particles, as spring and
 “ Thames-water do.”

Again, page 34, Mr. KIRWAN says,
 “ to Mr. HASSENFRAZ we owe the dis-
 “ covery, that coal is an essential ingre-
 “ dient in the food of all vegetables.
 “ Coal not only forms the *residuum* of
 “ all vegetable substances that have un-
 “ dergone a slow and smothered com-
 “ bustion, but also of all putrid, vegetable,
 “ and animal bodies. Hence it is found
 “ in vegetable and animal manures, that
 “ have undergone putrefaction, and is the
 “ true basis of their ameliorating powers.
 “ If the water that passes through a
 “ putrefying dunghill be examined, it
 “ will be found of a brown colour; and if
 “ subjected to evaporation, the principal
 “ part of the *residuum* will be found to
 “ consist of coal. All soils steeped in
 “ water

“ water communicate the same colour to
 “ it in proportion to their fertility; and
 “ this water being evaporated, leaves also
 “ a coal, as Mr. HASSENFRAZ and FOUR-
 “ CROY attest. Coal however,” Mr. KIR-
 WAN adds, “ cannot produce its beneficial
 “ effects, but in as much as it is soluble
 “ in water.” A strong argument this in
 favour of floating, and of floating with a
 solution of the putrefying contents of a
 farm-yard, or in other words, with a solu-
 tion of coal; and will the second or third
 using of such a solution, let me ask Mr.
 YOUNG, contain as much of this coal as
 the first using contained?

Page 40, Mr. KIRWAN writes thus:---
 “ Mr. RUCKERT is persuaded that earth
 “ and water, in proper proportions, form
 “ the sole nutriment of plants, but Mr.
 “ GIOBERT has clearly shewn the con-
 “ trary; for, having mixed pure earth of
 “ alum,

“ alum, silex, calcareous earth, and mag-
 “ nesia, in various proportions, and moist-
 “ ened them with water, he found that no
 “ grain would grow in them; but when
 “ they were moistened with water from
 “ a *dunghill*, corn grew in them prospe-
 “ rously.”

These quotations, I presume, will be
 deemed abundantly sufficient, by every
 unprejudiced reader, to substantiate the
 argument in support of which I have
 adduced them, and to give stability to
 the tenor of my book, for every deduction
 that we here meet with is clear and con-
 vincing; and indeed every result which
 appears in the whole Treatise, if it could
 be given in plain English terms, would
 be found to be in true unison with the
 common conclusions of every experienced
 farmer.

Page 313, Mr. YOUNG says, "It is a
 " common practice in Lombardy to have
 " a sort of heavy harrow drawn along the
 " bottom of the main-carriers, in order
 " to disturb the mud, in autumnal, winter,
 " and early spring irrigation ; and it has
 " been practised in England to throw
 " lime in, the great divisibility of which
 " body in water is well known. These
 " are means of adding to the manuring
 " quality of the water very easily to be
 " practised."

This paragraph, however late or re-
 luctantly introduced, is, in my opinion,
 of more value than the whole dissertation
 that precedes it ; and indeed it renders
 nugatory, or rather overturns, every an-
 tecedent position which Mr. YOUNG has
 given us in his Calendar on the subject of
 irrigation.

REMARKS

REMARKS

OF

*Mr. Smith's Book on Water-
Meadows.*

THERE yet remains one publication, which I cannot pass over without notice, and which I dare not suffer to pass without correction and censure, (although private motives strongly incline me towards commendation), as it professes to make its appearance under the sanction of names, deservedly in high estimation in the agricultural world; and which will give a currency and consequence to any book, and to almost any opinions.

It is written by WILLIAM SMITH, Engineer and Mineralogist, and as such,

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pecu-

peculiarly well circumstanced to write upon the subject of Irrigation, provided he had possessed a little more experience to have enabled him to discover the whole truth, and a little more disinterestedness to give him free liberty to speak it. As engineer, or rather drainer of land, and mineralogist, I believe Mr. SMITH is inferior to no man; but as a general instructor in the art of Floating, I venture to say, that he is very much surpassed by those very men whose knowledge he so repeatedly reprobates, and whose works he openly calumniates, and yet condescends to copy. For the Prislely Bog meadows, which, as *a whole*, are perhaps the most complete specimen of the art in the kingdom, and worthy of their late and of their present proprietor, are in fact only a faithful imitation, or a somewhat flattering likeness, of the meadows which

were

were formed by these abused floaters in Gloucestershire; and which meadows Mr. SMITH, I know, took considerable pains to make himself acquainted with, by a nice examination, and by a minute measurement.

Mr. SMITH, *in limine*, or however in the third sentence of his introduction, commences with a general and ungracious, if not ungrateful condemnation of the skill and operations of all that have preceded him in the department of Floating.

“ It is an evil of great national im-
 “ portance,” says he, “ that the direction
 “ and execution of this branch of agri-
 “ culture has so long been entrusted to
 “ those whose situation in life cannot
 “ afford them an opportunity of extend-
 “ ing

“ing their ideas further than the very
“spot they are employed upon.”

This, I must allow, is an imposing and a strong sentence, and one that often appears as a decorament in book-farming; but it is not just censure, neither is it dictated by sound policy; for every one who reads it will immediately be put upon his guard, and will see it in no other light than as the puff-indirect; for when a man is impetuous in pulling down characters, it is forthwith suspected that he is desirous of building for himself upon the ruins. Indeed, were I to employ a professed floater, I should not wish him to extend his ideas further than the boundaries of my meadow, and the regular distribution of my water thereupon. I can see no great cause for regret, that
these

these men have confined their views to one object, and “to the spots on which they were employed,” and have thereby formed in so masterly a style the valuable meadows which we find in various districts. I should not wish a man to charge me for his operations both as a philosopher, and as a floater, at the same time. The common and necessary charge of the common floater, is already the most stubborn enemy that the adoption of this practice has to contend with; and is in all cases found of sufficient magnitude, without superadding likewise the charges of a man of higher pretensions. Besides, these men of extended ideas, and extended demands, seldom extend their hand to handle the spade, which is a material consideration in the qualifications of an instructor of this kind; and especially so if he is engaged by the week.

When

When I first saw the meadows which had been formed by these men of confined ideas, I was struck with admiration, which I could not help extending to the men as well as to the meadows; and I immediately entertained a wish to recommend them to the employ of gentlemen in distant parts of the kingdom, and this I have done in repeated publications; and as I have not yet had cause to repent of what I have done in their behalf, I shall always esteem it a duty to defend them, as far as I can, from every attack of those who only excel them in the art of forming books.

Mr. SMITH immediately adds, “ it cannot be supposed that such men have any general notions of strata, nor can they judge where to search for water.”

Who,

Who, let me ask, would venture to commend it to a farmer, first to construct the expensive works of a meadow, and then to search for water for the use of the meadow? Rather let every one be advised to use to effect the water which he has already in his power, than to lose time in subterraneous researches after an inferior species of this element. The failures in irrigation, which Mr. SMITH so often laments, if they any where exist, have their origin in some such cause as the above, that is, in forming meadows for floating, without having first secured a supply of water. I have found a disposition of this kind too frequently occupying the minds of sanguine agriculturists, and tending to mischief.

Page 20, Mr. SMITH speaks of the antiquity of Irrigation; and says, "the
" practice

“ practice is more antient in Wiltshire
 “ than in any of the other counties.”

The invention of this art is likewise claimed by many old farmers in favour of the county of Gloucester; but I believe that the good people of both these counties will feel the necessity of relinquishing their pretensions to this honour, if they will peruse the Monthly Review for Oct. 1788, page 384, where they will meet with the following note:—“ We thank
 “ D. N. for his information concerning
 “ the antiquity of watering meadows in
 “ England, and particularly on the bor-
 “ ders of Wales. The most antient trace
 “ of the practice which he could discover
 “ in print, is in a book, entitled *Water*
 “ *Workes*, written by ROWLAND VAUGHAN,
 “ who seems to have been the inventor of
 “ the art, and to have practised it in great
 “ perfection,

“ perfection, and on a most extensive
 “ scale, in the Golden-Valley, in Here-
 “ fordshire, during the reigns of Queen
 “ ELIZABETH and King JAMES the First.”

Now it appears from WORLIDGE, who describes this art particularly as it was then practised in the county of Wilts, that Floating, or Drowning, as he calls it, had not there prevailed so far back as the time of ELIZABETH; for in page 19, of his book of Husbandry, he says, “ this is of late
 “ become one of the most universal and
 “ advantageous improvements in England
 “ within these few years, and yet not
 “ comparable to what it might be ad-
 “ vanced unto.” WORLIDGE wrote this book in 1687. And again, page 21, in his recommendation of the Persian wheel to throw up water for the purpose of irrigation, he says, “ the best of these wheels

“ was made by my direction, *anno* 1665,
 “ at Wilton, in Wiltshire, carrying water
 “ in good quantity above twenty foot
 “ high.”

Page 27, Mr. SMITH says, “ having suc-
 “ ceeded in the attempt to make good
 “ water-meadows, upon soils which have
 “ been deemed unfit for the purpose, and
 “ floated them with water that was equally
 “ condemned in point of quality.”

I do not know any experienced person
 that has deemed the soil of a bog, nor
 any other species of soil, “ unfit for the
 “ purpose of irrigation.” Boggy soil was
 deemed very fit for this purpose by BLITH
 in 1653, and has, I believe, been so deemed
 ever since, by every person who has paid
 due attention to the subject. Some of
 the best meadows in Gloucestershire are
 formed

formed upon a soil of this nature; and many good floated meadows may be found in various parts of the kingdom similarly constituted: and with respect to water, I can say that I have not heard of any species that has been wholly condemned for this purpose. Mr. SMITH, here, probably alludes to what I have urged concerning the comparative qualities of different kinds of water; for I have proceeded further, perhaps, than any other writer on the subject, in insisting on the superior efficacy of river or muddy-water, but I have never gone so far as positively to condemn any sort of water as unfit for the purpose of irrigation. I have only made such a distinction between clear and muddy-water as experience, as common sense, and as truth compelled me to make. I should have been happy to have had it in my power to have said, that all waters

were alike superlatively enriching to land; but I dared not to deal in such deception as, I am sorry to remark, Mr. SMITH has used, when he speaks of bog-water as flowing over the Prisley-Bog meadow, which circumstance I shall have occasion to notice more particularly by and bye.

Page 36, Mr. SMITH writes thus:---“ I
 “ have indeed heard of water being used
 “ to the great benefit of land in Scotland.”

I have the satisfaction of being able to inform Mr. SMITH, that floated meadows, of considerable extent and value, were formed in Scotland more than twelve years ago. The ingenious CHARLES STEVENS, and his sons, have, for many years, been wholly employed, winter and summer, in this way, in various parts of
 Scotland;

Scotland; and Mr. FERGUSON, Member for Aberdeenshire, can bear ample testimony of the extensive improvements which have been made upon his estates by BOLTON, another Gloucestershire floater.

Mr. SMITH's favourite meadow, near Woburn, is very much indebted for its productiveness to the penetrating judgment and indefatigable attention of a Scotsman, who has the management of the Prisley-farm, as bailiff to the Duke of Manchester, who occupies the farm: and I cannot help conjecturing, that Scotland will not much longer stand in need of English instruction in this art.

Lancashire and Yorkshire, Mr. SMITH here informs us, might likewise reap the advantages of irrigation; and I can assure him that floating is well understood in
some

some parts of Lancashire, and that premiums were awarded by the Manchester Agricultural Society to the proprietors of watered-meadows at least fifteen years ago: and into Yorkshire I have had the honour of sending three skilful operators to three gentlemen, who have not only improved their own land, but have widely disseminated the benefits of irrigation. To the first of these gentlemen, Mr. KELD, of Beverley, I sent Mr. PORTLOCK (a man of property and of science, who frequently amuses himself in excursions of this kind) sixteen years ago, to float under peculiarly favourable circumstances, with a mixture of salt and fresh water. A second floater was sent to Mr. WILKINSON, of Potterton-Lodge; and a third to Mr. GRIMSTON, of Neswick. All these gentlemen, I know, would be happy to exhibit their meadows, and to communicate for the benefit of their

their

their neighbours, and therefore I have taken the liberty of mentioning their names.

Page 46---“ This method would answer
 “ all the purposes of complete saturation,
 “ which seems to be one of the most essen-
 “ tial parts of irrigation.”

Saturation is an *evil* inseparable from, but not an essential part of, irrigation. Mr. SMITH will give up this idea when he has given this subject due consideration. Indeed this passage is directly at variance with what he has said in page 24, and is in opposition to his general assertions, whenever he mentions the advantages of the absorbency of certain soils. The grasses of a meadow require and perspire much water, but they require it to be duly administered to them ; and a surfeit, says
 Mr.

MR. KIRWAN, “ is as fatal to them as absolute
“ solute privation.”

And Mr. OTTO, in the Philosophical Magazine, vol. 18, informs us, that
“ water, as a medium of solution, keeps
“ the nourishment of plants in a fluid state,
“ and promotes its circulation; it is decomposed
“ in them into its principles hydrogen and oxygen, and must therefore
“ serve also as nourishment; for the oxygen is expired, and the hydrogen
“ unites itself with the solid parts. But however necessary water may be to
“ vegetation, a *superabundance* of it has a prejudicial influence on plants, as it
“ softens their fibres, so that the oxygen can easily produce a destructive putrefaction,
“ because they have no longer sufficient elasticity to expire it. Hence
“ the destruction of the crop by water in level
“ level

“ level fields, where marsh lands grow up
 “ in the room of the corn.”

Page 53, “ The benefit of these expe-
 “ riments depends so much upon the good
 “ management and patient perseverance
 “ of those who undertake them, that I do
 “ not wonder irrigation has so often proved
 “ unsuccessful. It is very necessary for
 “ the operator to have just ideas of levels,
 “ lines, and angles; a knowledge of super-
 “ ficial forms will not be sufficient. Ac-
 “ curate notions of solid geometry are
 “ absolutely necessary.”

Whether this is self-commendation or
 not, whether it is the trick of the trade or
 not, I do not say; but I must say, that it
 is placing an imaginary obstacle in the
 way of a practice which is valuable and
 easily effected. Where there is plenty of

good water, no man can err. Only bring the water along the highest parts of your land, and the water will soon shew you where it will spread. If you are deficient this year, try to improve the next. I find that alterations are not so very expensive as they are represented. A man with a good eye, with common sense, and with a proper degree of attention, will soon astonish both himself and others, with what he has done in his attempts at irrigation. I scarcely ever heard of a person's having made a fair trial in floating, and afterwards repenting of it. I can adduce many instances of gentlemen and farmers having formed excellent meadows, without any knowledge or instruction but what they derived from an attentive perusal of the very concise and imperfect sketch which I gave of this art in my first treatise. I myself have lately, without one grain of
solid

solid geometry in my head, and almost without the aid of lines or levels, formed a meadow of about five acres, which is just as productive as if it had experienced all the science, and all the costly parade of the first engineer or geometrician in Great Britain. My expenses hitherto have been very small, not more than a guinea *per* acre; but I am now making a few additional works, more for the sake of show than profit; for I am preparing to exhibit, if any person will honour my meadow with inspection.

Page 54: "Drainage," says Mr. SMITH,
 "is a most essential part of the art of irri-
 "gation; and it also appears necessary
 "for the designer of plans of irrigation to
 "be fully master of the art of draining,
 "which cannot be well understood but by
 "a knowledge of the strata."

This, with Mr. SMITH, may be true, when he receives the pay both of a drainer and a floater; but draining, in itself, is no more a part of irrigation, than it is a part of any other branch of husbandry; it should, indeed, in unsound land, precede every agricultural operation, but the floater always expects to find the land on which he is to work previously made dry to his hand; and it is the surface of the land, and not its strata, that he has to consider.

In the same page, Mr. SMITH objects to the floaters treading the beds of the meadow when the water is upon them; but he mistakes the intent of this treading, which is not had recourse to, to make them solid, as he supposes, but to make their surface *even*, that the water may communicate its benefit to every plant of grass alike, and that it may meet with no
improper

improper obstruction. His idea of leaving the surface uneven is certainly very erroneous; for thus some parts will have too much water, and other parts will have none to pass over them; and his direction to throw together large lumps of peat-bog matter, in order to make the "interstices larger," is still more improper, as is exemplified in the Prisleigh-Bog meadows; for when I saw them, the upper meadow, which had not received so much of the sand and gravel, which is abundantly brought down by the stream that is there used, had many of its beds in so porous and open a state, that the water found a ready passage through them, and did not rise high enough to flow over the surface. His feeders and floating gutters are all made too deep for such a soil: an experienced floater would have made them wider and shallower, when he had such loose materials to work upon. The very intelligent

intelligent Scotsman, Mr. KERR, who had the management of these meadows, complained much of this boasted absorbent quality of the land,

Page 62, Mr. SMITH says, “ Whether
 “ the heat of the water be or be not the
 “ cause of this extraordinary vegetation
 “ of grasses in a water-meadow, it may be
 “ difficult to determine.”

If heat be the cause here mentioned, spring-water must be the only water fit for the purpose of irrigation; for all other water will be found of the same temperature with the common air, to which it has been some time exposed; and spring-water, after it has flowed a certain distance or time, or has passed in a thin sheet over a bed of grass, will lose its native heat, and will then freeze as soon as river-water: and this power of resisting the effect of
 frost

frost, and the steadiness of its supply, are the only excellencies which are found in this, and not in other waters. Mr. Boswell, as we have seen, ventures further upon this idea of heat than Mr. Smith, and supposes it possible that heat may be generated by the friction of the water upon the grass as it passes through it; but what velocity must Mr. Boswell give to this water to produce this wonderful effect? At least the rapidity of the wheels of a mail-coach will be required. Heat, surely, must be a very meagre allowance of food for hungry grasses; for the most eminent chemists and philosophers have proved, that grasses stand in need of a constant supply of meat as well as drink. They have discovered that plants are fowl feeders, and, like Falstaff, “forswear thin potations.” The celebrated Mr. Bergman and Mr. Ruckert have shewn, by a minute analysis, that

that grasses contain not only water but coal, and four different sorts of earths and salts.

Page 68, Mr. SMITH says, “ It is evident, that both clean and muddy-water produce the same effect; and I am induced to think, that any judicious observer of the meadows of these counties in the months of February, March, and April, will give a decided preference to the clean-water crops. I have made this distinction between the two parties who have espoused the cause of water-meadows; and find, on a candid examination, their experience has proved them both right, with regard to the operation of water, however they may differ in their opinion of causes.”

If Mr. SMITH argues generally from particular instances which he has met with

with in Wiltshire, he argues at least dangerously. The springs in Wiltshire are, for the most part, chalk-springs, and fully charged with a solution of chalk. If a glass full of this water be suffered to remain at rest for two or three hours, a large deposit of chalk will be made, which is known in this state of solution to be very fertilizing to land. But I am not satisfied with this superior excellence even of the Wiltshire clean-water; for if it will produce as great a quantity of grass as water that contains the wash of a village, (which I am confident it never will *cæteris paribus*), yet it will never raise grass equal in quality to that of the turbid-water crop. I am not contented with *quantity*, I want grass that cattle will eat. I shall not submit to the decision of Mr. SMITH'S "judicious observer;" I shall introduce an animal far surpassing man in discernment

of this kind; I shall call in an ox or a sheep; and if either of these *judicious tasters* shall decide against me, I will then at once drop all my muddy argumentation. I have tried this point, and have seen it proved by others in a variety of cases. I use two clear springs, and a very muddy stream, in one and the same meadow; and I have a much greater quantity of grass on the part where the muddy-water flows, than on the other part which is irrigated by the spring-water; and my oxen and sheep never condescend to bite the latter, until the former has nearly disappeared, and this too, notwithstanding the spring-water part has twice the fall of the other part; and fall is a powerful sweetener of the crop. If Mr. SMITH will cause only a part of a load of rotten dung to be thrown into one of the feeders of the Longleat-meadow, and suffer the
water

water to pass through or over this dung, he will soon see by the colour of the grass how far this water extends, and when the grass is eaten off, its extent and effect will be marked out still more evidently.

Since writing the above, however, I have examined a little more closely Mr. SMITH's description of what I suppose to be the far-famed Longleat-meadow; and I begin to suspect that there has been something like a deception played off upon us, by Mr. SMITH and others, who have spoken rapturously of this meadow. Mr. SMITH owns, page 73, that the water of this meadow "comes partly from the tail of a mill, and partly from the pond above it." Hence it seems to appear, that this reputed pellucid spring-water must, in a rainy season, be as muddy as the water of streams in general.

Page 74, Mr. SMITH says, " This is
" one advantage which meadows that are
" floated with clear-water, have over those
" which are floated with water that would
" make the grasses foul or gritty, as the
" practice of floating may be continued
" longer with clean than foul water."

This I must take the liberty of contradicting, for thin water requires to be shifted very often, otherwise it will generate a scum, which Mr. SMITH and every one knows will do much more injury to the grass than the foulness or grittiness to which he objects.

Mr. SMITH immediately adds, " The
" meadows floated with clean-water, have
" also the advantage of turning it on to
" soak the grass a few days or a week
" before mowing."

I should

I should not advise any person to avail himself of this advantage, for the three reasons which I have already mentioned. And before he wrote the above, Mr. SMITH should have recollected, that in a dry season, all water is clean enough for the above purpose; and in a wet season, the grass could not want the soaking which he recommends,

Page 78, Mr. SMITH says “ Where water has been used a hundred times, if the last land be equally fit to receive it, the effect is equally beneficial; and I need not quote a stronger proof than the meadows about Salisbury, which are floated with water frequently used in the different vallies which are united near that city.”

I have been seeking for proofs of this
assertion

assertion of Mr. SMITH's for these eighteen years last past, and have not been able yet to meet with one. I have seen a variety of meadows in which the water has been used twice; but I have as often found, that the second using was defective, both as to the quantity and quality of the grass thereby produced: and where the water has been used more than twice, I have invariably discovered a still greater inferiority in crop. I have never yet seen a bed, or the side of a ridge, in a floated meadow, as productive and as palatable to cattle in its lower part as in its upper part, provided it was five or six yards wide. But Mr. SMITH has himself confuted his own hasty affirmation, in various parts of his book, particularly in page 39, where he allows, that the wash of a single street of Norwich, when used in floating, would make the adjoining meadows exceedingly

ceedingly rich and valuable: and in page 52, where he says, “ the sediment which “ *should go out upon the beds*, is less liable “ to lodge in the bottom of the feeders.” What Mr. SMITH adduces as a proof of his assertion, is a mere fallacy: for there are no two meadows in the neighbourhood of Salisbury, which use precisely the same water. I have seen these meadows, and have seen that they use the water in the same way that the meadows on other streams use it. After one meadow has used it, it returns into the bed of the stream, and receives additional matter, before it is used again. In a rainy season, there is no one meadow, in that range, which uses *all* the water; therefore every meadow has a certain portion of what is called the first water; and there is then a continual influx of fresh water, and fresh
matter

matter, from every ditch, sink, and furrow which lies on both sides of the rivulet.

But it is to the interest of Mr. SMITH, that the merits of clean water (as he calls it) should be exalted; for, as he wishes to be employed, both as a drainer and as a floater, at the same time, it is requisite that he should make clean water appear worthy of being thus sought after and used.

Page 82, Mr. SMITH says, (speaking of the common farmer) "It is truly astonishing how little use some men make of their eyes and understanding, and I have been ashamed to point out to them things the most self-evident."

It would be more astonishing were
farmers

farmers implicitly to submit to learn their farming from men who are no farmers. It is truly astonishing that the writers on farming, of the present day, should be found to be any thing rather than farmers. Is it so in other professions and occupations? Such expressions as the above can, I think, only tend to widen the breach, and to increase the contempt and derision in which the book-farmer and the common-farmer hold each other. If we really have any information to communicate to the common farmer, let us state it in such language as will induce him to read what we have to say with patience and attention. Let us not insult, where we cannot instruct: for the most enlightened of us, I conceive, has far more knowledge to receive from, than to convey to the common farmer. Short-sighted, and stupid, as Mr. SMITH has found him, he has never

yet found him guilty of preferring *clear to muddy-water* in floating. This was a discovery reserved for those who love to derive every thing agricultural from a profound, a preternatural, or, what they call a philosophical source. The common farmer knows, by experience, that the common land flood, the practice of warping, or any thing else that brings mud and dung upon his land, brings that which does good to his grass the whole year afterwards.

Page 98, Mr. SMITH says, “ By my
 “ plan of combining draining with float-
 “ ing, they,” *viz.* the Prisleys, and other
 bogs, “ have been converted into mea-
 “ dow-ground of the first quality, and
 “ that by the means that were found on
 “ the spot, and which were previously the
 “ cause of its sterility.” And again Mr.

SMITH

SMITH says, in the next page, speaking of the Prisley-Bog meadows, “having obtained by the drainage a quantity of water, nearly equal to that of the brook, and which I was very anxious to use, being, by an ochrey appearance, hitherto deemed unfit for floating.”

If Mr. SMITH could have established what he has here asserted, his Prisley wonders would have been worthy of being recorded in a book. If bog-water had been found there, to possess qualities which it never possessed elsewhere, the discovery would have deserved at least publicity; but the fact is, Mr. Smith has deceived his readers; he has all along given us to understand, that the water which he used upon the Prisley Bog meadows was *bog water*, or, as he here says, that which was before the cause of its sterility,

rility, is now the cause of its fertility. But this is by no means the case : and the water, which he says he “ has obtained by “ the drainage, is so far from being nearly “ equal to that of the brook,” that it is not even a thousandth part of it.

A friend and I went last year, in the month of November, purposely to see these meadows ; and when we enquired of Mr. KERR, who had the management of them, where we could see the bog-water, he answered, “ there is no bog- “ water, at least none worth noticing ; if “ we had nothing to depend upon, in our “ watering, but bog-water, our meadows “ would make a very poor figure.” Indeed the truth of this was very manifest, for the stream there in use was rapid and powerful, and as turbid as any that I had ever seen used ; it had flowed several miles ;

miles ; it had crossed several public roads ; had received the wash of a large tract of country and of villages, and carried along with it not only mud, but sand and coarse gravel, which Mr. KERR had very wisely just been throwing out of the feeders upon the surface of the land, and without which, he told us, the water would do little good. and yet this water is called “ *bog-water,*” and of an “ *ochrey appearance.*” And this, it seems, is one reason why a decided preference is given to clean-water in floating. This deception however tends to invalidate every other proposition in his book, and renders no service to the cause which Mr. SMITH has undertaken to advance.

In the remarks which I have hitherto made, as preparatory to a more clear conception of the method of floating, which I am about to describe, I have endeavoured

voured to place the practice in as many different points of view as possible, which attempt, if it will not serve as an illustration, will, I hope, promote the discussion of a subject which is perhaps as worthy the attention of the agricultural part of the community, as any one that has of late engaged its consideration.

THE
METHOD

OF

Forming a floated Meadow.

BEFORE I begin to point out the particular mode of forming a floated meadow, such questions as the following are necessary to be proposed :--- Will the stream of water to be employed in floating, admit of a temporary wear or dam across it? Can you dam up, and raise the water high enough to flow over the surface of your land without flooding and injuring your neighbour's adjoining land? Or, is your water already high enough, without a wear; or, can you make it so, by taking it out of the stream higher up, and by the conductor, keeping it up nearly to its level,

level, till it enters the meadow? And can you draw the water off your meadow as quick as it is brought on? If these questions suggest no insuperable difficulty, but can freely be answered in the affirmative, you may proceed according to the following directions:

In the first place, when the descent is not sufficiently great to be determined by the eye, take an accurate level of the ground intended for floating, and compare the highest part of it with the height of the stream of water to be used. Ascertain how many inches fall there are, from the surface of the water, to the highest part of the land: if the highest part of the land be adjoining to the stream, the process is easy; but if, as it often happens, it be distant from (or the farthest part from) the stream, the execution becomes

comes more difficult; as it is necessary that the sides of the ditch, which conveys the water for distribution, should be raised all that distance, and kept high enough to carry the water to the aforesaid highest part. In this case cut, in as direct a line as circumstances will allow, a wide ditch, or master-feeder, keeping up its banks, not upon a dead level, but with a gradual descent from beginning to end. Supposing, for instance, the highest part of the meadow to be one hundred yards distant from the stream, and you have five inches fall in that distance, you are to give to the whole length an equal degree of descent, that is, to each twenty yards, one inch fall, and then every drop of water will be kept in equable and constant motion.

Sometimes the land has a very uneven
x surface,

surface, and there are two or more parts of it considerably higher than the rest; it will then be necessary, as in plate 2, to give to each higher part its respective feeder. It will be found, that one feeder made diagonally, and two others in different directions, something similar to plate 2, will, in general, with the assistance of the smaller works, (whatever be the form or situation of the meadow), be competent to effect a regular distribution of the water over the whole surface of the land.

The width of each feeder depends upon the number and length of the smaller ditches, or floating gutters, which it is to supply with water.

Mr. PEARCE, in his last formed meadow, has ordered his master-feeders and master-drains

drains likewise to be made considerably wider than usual, to have their sides sloped down gradually, and the whole turfed over, that there may be no loss of land. This practice, I think, is not only allowable but eligible, where you have room for it, and are sure that you have fall enough for the water to work well. There will generally be more grass in these low parts than on any other part of the meadow at the mowing time; but it will not be eaten off so bare as the other parts in spring and autumn. An instance of this may be seen at Trentham-Park, Staffordshire.

The depth of each feeder should be regulated by the depth of the stream, and the lowest part of the land; *i. e.* it should always be made as deep as the bottom of the stream, if any part of the land be

low enough to draw the water from that depth.

The soil that is thrown out in forming the feeders, is placed along the sides of them where wanted, and is always trodden down firm, and with an even descent, on the upper part of the adjoining bed,

A flood-hatch is placed in the mouth of each master-feeder, in order to admit or exclude the water at pleasure; and to enable the proprietor to float the different portions of the meadow in turns, when there is not water enough for the whole.

The next part of the process is that of forming the second order of ditches, or the floating gutters. These are to be cut from, and at right angles with the above feeders, provided the surface of the land be tolerably

tolerably even, as in plate 1; but if the surface be very uneven, they may be made irregularly along the higher parts of the ground. The distance of these gutters from each other, must be determined by the abundance or scarcity of water. When water is plentiful, they should never be made at a greater distance from each other than ten yards; but when it is scarce, it is necessary, in order to strain the water to the utmost, to cut them at nearly twice this distance, or to make one gutter where two are desirable. It is to be observed, that these gutters are to be made with the same regular descent as the feeders, and that both become gradually narrower as they proceed, as in the plates; for the quantity of water becomes less and less, by some flowing constantly over the sides, and some being drawn off by the smaller ditches.

The

The earth that is thrown out, in digging the floating gutters, is to be placed on each side of them, where most wanted, in such a manner as to afford an even surface, and a regular descent to the beds, which two beds constitute what is called a ridge. In plate 1, fig. 1, I have endeavoured to represent a ridge of a meadow, in this its first rude state of formation; and in fig. 2, I have attempted to exhibit it, in that state of perfection which it will acquire in a course of years. If there are but few inches fall from the uppermost end of these gutters to the lowest part of the land, use as little of this descent as you well can in the gutters, and reserve the greater part for the sides of the ridge, that the water may flow down them with the greater rapidity; for it is more requisite that it should flow quickly over the beds than

than in the gutters, though in them it ought never to stagnate.

If, in cutting the above works, any very low part or deep ditch obstruct the progress, it will be easy to carry the water over it, by making a continuation of the feeder or gutter, by means of a few boards nailed together ; and this carry-bridge, as it is called, should be of rather larger dimensions than the respective feeder or gutter, that no obstruction be given to the water in its course.

If a road or small eminence oppose the extension of your works, this obstacle, likewise, will readily be removed, by conveying the water underneath, by means of a trunk, consisting of four strong boards nailed together, leaving likewise a passage of sufficient dimensions to give the water
a free

a free current. Drains are not unfrequently carried under the other works, by trunks of this kind.

Having finished all the ditches which are necessary to introduce, and spread the water, these will shew where the drains are to be made, to receive and carry off the water as fast as it is brought on. One drain is to be cut between every two gutters, parallel to and equidistant from each, if the evenness of the land will permit; if not, they are to be made, according to the irregularity of the lowest parts of the meadow. Each drain may be made as deep as you please. The drains are made in an order, which is the reverse of the preceding works; they are narrowest at the higher part of the meadow where the other ditches are widest, and gradually increase in width, as is represented in the

two

two first plates, till they descend into the master-drain, which returns the water into its usual channel, or diverts it into some other course.

The master-drain should always, either by depth or width, be made capable of carrying off as much water as the feeders introduce, since it nearly receives as much; for, on a well-formed meadow, less of the water will soak into the soil than is generally imagined, especially when the water is muddy, and leaves an unctuous sediment on the surface, which happily, in a certain degree, prevents soaking.

Having thus completed the formation of the various ditches; having pared down every small unevenness on the surface, and given to each part of the meadow its appropriate fall, let in the water, and you
Y
will

will find that it will flow on towards the ends of the floating-gutters, and will seldom spread itself, as you wish, on the higher parts of the meadow. This is to be remedied by placing stops or obstructions in the feeders and floating-gutters, at distances proportioned to the descent of the land. When the velocity of the water is great, the stops of course will be numerous. A stop is usually made by driving down a few stakes in a line across the ditches which distribute the water, and may be increased by placing a board, clods of earth, &c., at the front of the stakes. By the obstruction which these stakes, &c. give to the course of the water, it is checked in its progress, and is raised, and kept up to a proper height, either to flow over the sides of the ditches, or through small notches cut in their sides, at the distance of about a yard from each other,

other, as I have endeavoured to represent in the plates. Indeed, the contraction in the width of the feeders and gutters, serves to raise and force back the water over their sides; but this is not a sufficient obstruction when the descent is considerable. Stops and notches have hitherto been thought indispensably requisite in the construction of these meadows; but I have lately been informed by one of the above skilful floaters, that he, in the last spring, formed a meadow, which distributes the water with the utmost regularity, without the assistance of either stop or notch. The proprietor of this meadow, (Mr. TALBOT, of Penrice Castle, in Glamorganshire), who seems to have viewed the practice with no common degree of penetration, finding that his land and his stream were properly-situated for the purpose, was determined, whatever might be

the expense, to have a floated meadow, complete in all its parts, and from which even the appearance of imperfection should be excluded. Orders were accordingly given that the land should be formed into ridges of ten yards width; that each feeder and gutter should have its appropriate descent of one inch in nine yards; and that each bed should be a perfect inclined plane, with two inches fall in each yard. This plan was strictly observed, and every inch of the ground was worked by line and level; and when the surface was grown sufficiently firm, the water was admitted, and was found to flow over every part, in a sheet of equal depth, without any other check than what arose from the gradual contraction in the width of the gutters.

This meadow is probably as perfect in
its

its formation as any in the kingdom; but that it is therefore the most productive, I dare not venture to say, for fertility depends more on other causes, than on exquisite nicety of construction. There is no doubt, however, of this meadow's affording an abundant remuneration to its owner; though the expense must have been great, I believe fifteen guineas *per* acre, as the land, before it was formed into a meadow, was little better than a bed of rushes; but will now, I am told, be worth more than three pounds *per* acre. This specimen of perfection, however, is not here introduced as a general model, but only for the imitation of such gentlemen as enjoy the ample means and liberal mind of Mr, TALBOT.

There is still an inferior order of ditches, called trenches, requisite in the art of floating, whose office it is to convey the
 water

water to any part of a meadow which the larger ditches will not effectually reach, whether it be to the extreme angles of the ridges, as is represented in plate 1, T. T., or to any part in a wide and imperfectly formed bed, which is higher than its general surface. A trench of this sort is cut from the floating-gutters, about six or seven inches wide on the surface, and terminating, at the bottom, in nearly a right angle; and the portion of earth which is thus cut out, is regularly laid unbroken along the lower side of the trench, both to keep up the water to its desired height, and to be restored and trodden down with the turf uppermost, when the floating is finished, into the space which it before occupied. When the soil is thus replaced, the green-sward is not only not injured, but is improved by this cutting; for an extraordinary luxuriance is always discernible, in the
 hay-

hay-crop, in the line in which the trench was made, owing to the mud, which is ever found abundantly deposited at the bottom of each trench.

I deem it wholly unnecessary to give any directions for the construction of water-hatches or flood-hatches, either as sometimes forming a part of the wears, or as requisite to be placed in the mouths of the feeders, as in plate 2, F. 1, 2, 3; for the common carpenter, in every village in the kingdom, must have seen them, and is capable of making them. One caution, however, may not be amiss, that care be taken that the frame and foundation of them be deeply and firmly bedded in puddled gravel, or well-rammed clay, and both the sides and bottom of them be cased with stone or boards; for if the water once finds a passage either under, or by the sides of these erections,

it

it will soon become powerful enough to blow up the whole work.

Wears or dams are generally recommended upon an expensive plan, with two, three, or more hatches; but I have seen wears, in different parts of the kingdom, of a more simple make, and yet equally strong, and perfectly adequate to the purpose of a dam, though constructed at one-fifth part of the expense of the others: it is therefore my duty to recommend these in preference to the others, especially in those instances where the whole charge falls upon a mere renter of the land. I have frequently seen a strong and effectual frame of a wear composed only of two rough pieces of timber, and a few stakes, in the following manner:— One of the pieces of timber, or beams, was laid across the bottom of the stream, below the water; the other across the
top,

top, above the water, each beam having its ends firmly fixed in the banks on each side of the stream; and the stakes were placed in a perpendicular direction to the front of these beams; the lower end of each stake resting in a deep groove cut along the uppermost side of the lower piece of timber, and the upper end of each stake bearing against the upper piece of timber. For the position of the uppermost beam, and the upper ends of the stakes, see the wears across the stream in plates 2, 3. The lower piece of timber, in this case, is always placed a few inches higher up the stream than the upper one, that the stakes may stand perfectly upright, at the same time that they bear against the uppermost piece of timber. Having thus obtained the outworks, or frame of a wear, it will be no difficult matter to fill up, and complete

it, with a variety of materials, such as each situation shall most conveniently furnish. When the stream, which is to be obstructed or diverted by a wear, is as much as three or four yards in width, it is generally found requisite, to complete it, by placing portions of boards to the front of the stakes, nailed together, in quantities agreeing with the dimensions of the stream; but when the stream is of less width than three yards, it will be thought superfluous to give any directions respecting the materials which ought to be used in a wear. Behind each wear and flood-hatch, a board or plank is always laid over the stream or feeder, for the person to stand upon to regulate the water.

The dam which I use is a very inelegant one, but a very cheap one, and suf-

sufficiently effectual to divert a brook that generally affords water enough to work an undershot-mill, or to float five acres at once. It is nothing more than a strong common stake-hedge, having its interstices filled up with clods and earth. I do not, however, say that I have had recourse to this species of dam by choice, but from necessity; for the land on one side of the brook only is my property, and I should therefore probably not be allowed to cut into the opposite bank, in order to erect a permanent dam with flood-hatches. Some of my readers may be similarly circumstanced with myself, and therefore I have thought my dam not too despicable to appear in print.

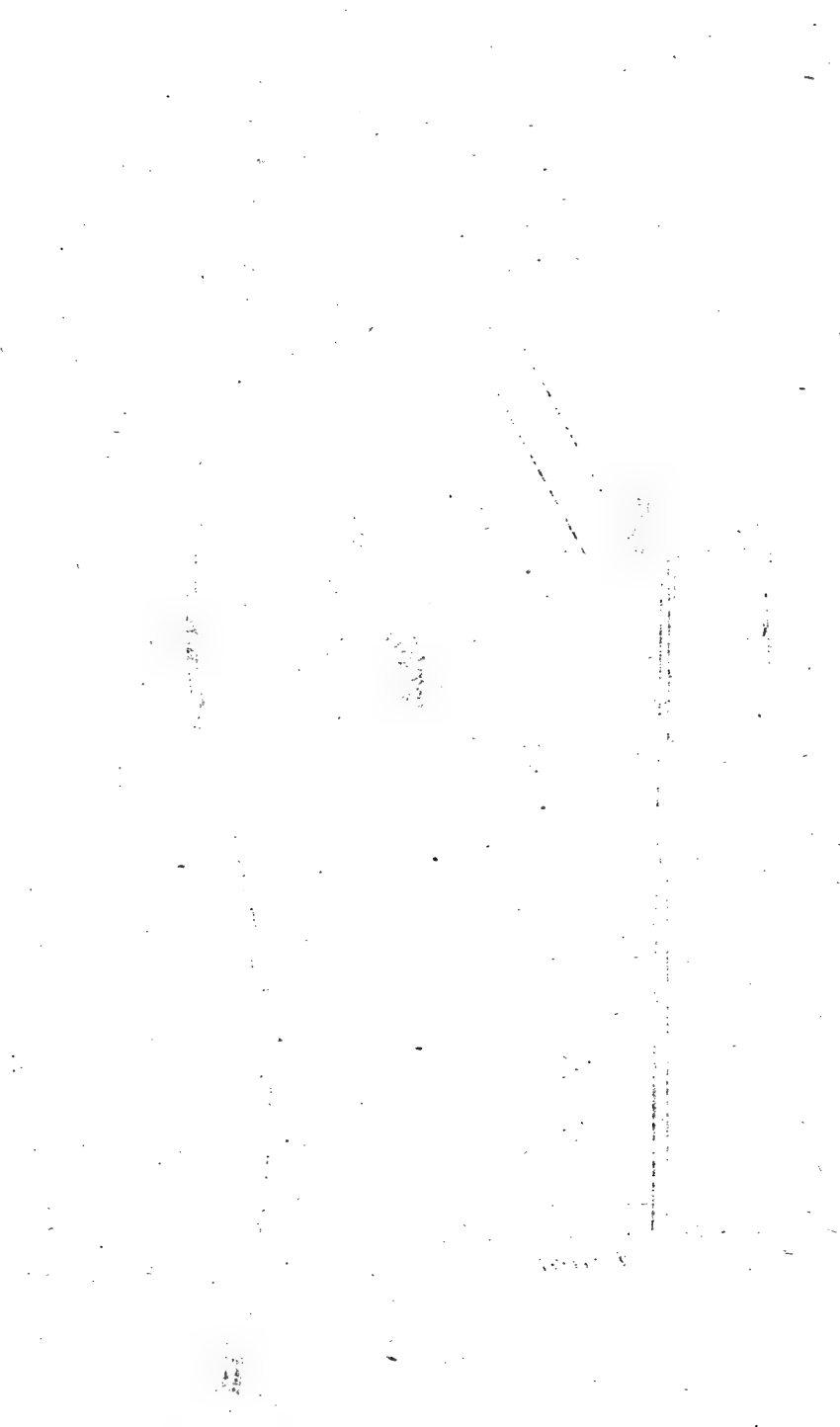
I have frequently been interrogated respecting the practicability of raising water by machinery, for irrigation, from

streams too low to be diverted by dams ; but I have been deterred from attempting to give much encouragement to the idea, from the apprehension, that the quantity of water, that might be raised thereby, would not correspond with the magnitude of the expense. I shall, however, venture to recite a few instances of what has been done in this way :---A steam-engine, at St. Astle, we are told, raises sixty-three gallons at every stroke, fourteen times in a minute. The very ingenious Dr. CARTWRIGHT informed me, that he had erected a steam-engine for his brother, for the purpose of irrigation only, which, if my recollection be correct, raised nearly the same quantity as the above engine and that he had erected another, near Brentford, of greater power. The expense of the former of these two was one hundred pounds. The steam-engine,

engine, which was erected near the West-India Docks, at Poplar, raised, I suppose, more water than any of the above-mentioned; and yet, as far as I could judge from the appearance of the stream that flowed from it, it did not afford water enough fully to float three acres at a time. DENON tells us, that in Egypt wheels, with pots affixed round them, are worked by oxen, to raise water for irrigation; but he says that windmills would answer the purpose much better. Mr. TATHAM mentions the Persian wheel, which is worked by the stream from which it raises the water, as having been used in irrigation in America; but he says the German lifting-wheel has equal power with the Persian, and is preferable to it for simplicity and cheapness. Mr. TATHAM is bold enough to assert that, by means of machinery, water might be raised

raised, and carried along the “back-bone of England,” in sufficient quantity, not for irrigation only, but for every other purpose to which water is applicable.

If any other directions are wanting, to give a clear conception of the art of floating, I hope they will be found in the following description of the plates,



Description of the Plates.

PLATE I.

By Plate 1, I have endeavoured to represent a meadow, which has no material irregularity in its surface, but has one gradual descent, in the same direction with the current of the river or stream. This meadow is supposed to be too high to be floated from that part of the stream which is nearest, and immediately opposite to it; and therefore, in order to gain fall, or power, the water is taken out at a higher part of the stream, and conveyed by the conductor, marked C., into the feeder, which has a flood-hatch placed in the mouth of it, to admit or exclude the
water

water at pleasure. This conductor, (we will say, for the sake of illustration,) has only four inches descent in its whole length, but the stream in the same distance falls ten inches ; therefore six inches of power are gained by means of the conductor, which power, or fall, is abundantly sufficient to cause the water to work well upon the meadow. This mode of gaining or reserving descent is well worthy of public attention, and, if generally adopted, would bring thousands of acres within the fertilizing power of this practice, which are now thought to be utterly beyond the reach of the water. I have seen water thus conducted for more than the distance of a mile, which has afterwards amply compensated for the expense of the work. The feeder in this Plate is cut along the higher part of the meadow, and from it, at right angles, the floating-gutters

gutters are made to branch down the descent of the meadow. The floating-gutters I have marked with a double line, in order to shew more plainly the summit of the ridges along which they proceed; and all the ditches described by single lines, are drains which receive the water, after it has passed over the sides of the ridges or the beds, and these convey it into the master-drain, which empties itself into the bed of the stream, at the lowest corner of the meadow. One drain, as is shewn in that which is nearest to the flood-hatch, should, in every meadow, have so near a communication with the feeder, that, when the water is to be taken off, the hatch may be let down, and the mouth of this drain opened; and then every bed will almost instantaneously be laid dry, and no water will long remain in the ditches to soak into the land. I have

represented the stops, which are required in the feeders and floating-gutters, by small circles and the letter S. The strong lines, drawn from the lower end of two of the floating-gutters, and marked T. T., are meant to signify two shallow ditches, called trenches, whose office it is to carry the water to the corners of the beds, which otherwise, in many instances, would not reach them.

To float such a piece of land as this, where the declivity is gentle, and all one way, can be no very difficult task, one would think, even to a person who has never seen a meadow watered by art.

By Fig. 1, in this Plate, I mean to represent a transverse section of a ridge, made on a flat surface, in its first year of formation, when it is only raised a little in
the

the centre, with the soil that is dug out in making the floating-gutter and drains, and has just descent enough to throw the water into the drains.

Fig. 2, in this Plate, is meant to denote a ridge, in its full and complete elevation, with its sides or beds a perfect inclined plane, with the desirable fall of about two inches in each yard.

PLATE II.

IN Plate 2, I have attempted to delineate a floated meadow, formed from a piece of land which had an irregular surface, or which had three parts considerably higher than the general surface of the land. In order to throw the water over these higher parts, it was necessary, that each should be accommodated with a separate feeder, as is shewn in F. 1, F. 2, F. 3; and that each of these feeders should be so constructed, as to suffer the water incessantly to pass over the whole length of its sides, and into the floating-gutters; and at the same time, to convey water enough to cover these distant parts. In this instance, the stream, by means of a dam erected opposite to the highest corner of the meadow, is found to be high enough to overflow every part of the surface, without the necessity, as in
Plate

Plate 1, of fetching the water from a higher part of the stream, In this plate, I have endeavoured to exhibit one feeder in the act of distributing the water. By means of the wear, or dam, which, it will here be seen is made so complete as not to suffer any water to flow down its usual channel, the whole stream is diverted and made to pass through the conductor, and through the uplifted hatch, into the feeder F. 1, where meeting with the obstruction of the stops, it is forced into the floating-gutters, and over the left side of the feeder, or through notches or small apertures, which I have represented as spreading the water, not only from the feeder, but likewise from the floating-gutters. It will here likewise be seen, in what manner the drains unite in conveying the water into the master-drain, which reconducts it into its wonted course. The bed of the river below the
wear,

wear, it will here be observed, is entirely free from water, or empty; therefore the returning water is drawn off the meadow by that depth of the bed of the river, added to the descent which is found in the distance between the wear and the mouth of the master-drain. The hatches, in the mouths of F. 2, F. 3, are shut, and no water, of course, is upon that part of the meadow which they are made to float; when, however, that part which is supplied by P. 1, has had the water a sufficient time, its hatch will be let down, and these two opened; for the stream will afford water enough for F. 2 and F. 3, at one turn, as they both are not required to supply a greater extent of floating-gutters than F. 1 supplied. Thus, in this meadow, the process of floating may conveniently be alternate through the whole winter.

Some-

Sometimes the land intended for this operation has already been ridged up by the plough; and then the process of laying out for floating is perfectly easy, and inconsiderable in expense. The work, in this case is, in fact, done to your hand: you have nothing to do but to make a wide ditch along the headland, and smaller ditches along the summit of each ridge, and the water will be regularly distributed and pass off by the furrows. If one headland is insufficient to give the water a proper descent, another, or more, will be easily made, by filling up the furrows as high as the ridges, and by cutting a drain across the ridges. Every person should form to himself the idea of a field thrown into headlands and ridges, before he sets about the formation of a floated-meadow.

PLATE III.

IN Plate 3, I have given a sketch of a species of floating, commonly called catch-work, a species very different from that which I have described and recommended above, and which ought never to be adopted when the other plan is practicable. In some situations, however, the declivity of the land is too great to admit of its being thrown into ridges, with their respective floating-gutters pointing down the descent; and therefore it becomes necessary to make the distributing ditches at a certain distance below each other, *across* the declivity, to catch the water, again and again, from the top to the bottom of the meadow. It is evident that the contents of the water, thus repeatedly used, are not equitably disposed of, for the upper beds must receive more than their share

share of whatever nutriment it deposits. The best method which I have seen of adjusting this inequality of distribution, is the following :—to continue the feeder down the centre of the declivity to the last bed, and then by means of small hatches placed below the ditches, as in the plate, which are so contrived as to suffer a certain quantity of water to pass through them, some of the first and best water is conveyed, unused, even to the lowest bed. These hatches likewise give a power of floating the beds alternately, or of throwing the water over the first and third, and laying the second and fourth beds dry, or *vice versa*.

I am sorry to say that I have seen the common plan of catch-work watering resorted to, when there was no absolute necessity for its adoption, when there has

been no rapid descent in the land to demand it; I have seen it used, merely because it was less difficult in the execution than the other system, and because it did not require so great a number of stops, which, Mr. BOSWELL says, page 124, "Would offend the eye greatly." I confess that I am not one of those who view stops in a meadow in the light of a deformity, but rather one of those who think that nothing can tend to disfigure a meadow, that is instrumental in producing a good crop of grass. When I see a great number of stops in a meadow, I know that the water flows with its proper rapidity, and in proper quantity, and will have its profitable effect.

This plan will immediately be understood upon viewing the Plate, and is easily executed. I have introduced notches here,

as well as in other Plates, not as absolutely necessary in either plan, but as giving a facility in the execution of each. The place of the notches is not certain or fixed, but variable at pleasure. In many instances there is considerable fall in the upper part of a meadow, and only a very small descent in its lower part: in these circumstances, catch-work may be adopted on the higher part, and the ridge and furrow-plan on the lower, with the floating-gutters branching at right angles from the lowest distributing-ditch of the catch-work.

DIRECTIONS

FOR

The Management of a Floated-meadow,

IN EVERY MONTH OF THE YEAR.

HAVING proceeded thus far, and having done all in my power to draw the occupiers of land into the expense of forming floated-meadows, it becomes a duty, probably, that I should advance one step further, and endeavour to give them such directions, for the management of their meadows, as may assist in affording them some of return. In attempting this, I shall adopt the fashionable (but not always seasonable) form of a calendar; and shall commence with the month of July: for, even before the end of this month, I think we should
begin

begin to look forward towards the operations of the succeeding winter; or we should begin to eat off the lattermath of these meadows, whilst it is yet young and tender; for if it is not taken in that state, it will never be eaten off as close as it ought to be.

In the month of August increase, rather than diminish, the number of the stock in your meadow.

In September, admit your lean, hungry stock, and let it consist, if convenient, of the three species, that what one kind refuses, another may bite close.

About the middle of the month of October, we will suppose that the meadow is brought to the desirable state of bareness. Now begin to repair the injuries which it
may

may have received from the treading of the cattle, or from other causes. Cleanse the bottom and sides of every order of the ditches from grass, and every obstruction which might impede the motion of the water; especially if you have but little fall in your meadow. A breast-plough is a very useful instrument in the cleansing of the larger works. The cleansings should be used, and trodden down even, in any parts of the meadow that are lower than the rest, in order to make every bed, or side of a ridge, as nearly as possible, a perfect-inclined plane. Before the end of this month, every floated meadow should be ready, at all points, to receive the first flood which shall now offer itself.

At the beginning of November, free admission is the order of the day; for the water which you now receive, especially
if

if it arrives in the shape and in the magnitude of a flood, is found peculiarly enriching, and will not fail to ensure a good crop of spring-feed. Do not entertain the apprehension, which Mr. BAKEWELL and other gentlemen have entertained, that water used at this time will surely give you a plentiful crop of docks, and other weeds, in your meadow. I have abundant reason to think, that this fear has no foundation in fact.

In the months of December and January, the chief care of the floater consists in keeping the land sheltered by the water from the severity of frosty nights. It is necessary, however, through the whole of these months, every ten days or fortnight, to give the land air, and to lay it as dry as possible for the space of a few days. Whenever the frost has given a complete
sheet

sheet of ice to a meadow, it may not be amiss to discontinue floating, for the frost will sometimes take such strong hold upon the land, as to draw it into heaps, and very much injure the evenness of the surface of the beds. It is requisite, in these two months, that each meadow should be inspected at least once in every week, to see that the equal distribution of the water is not obstructed by the continual influx of weeds, leaves, sticks, and the like.

In the month of February, a more than common degree of attention is required by the floated meadow. If you now suffer the water to flow over the meadow for the space of many days without intermission, a white scum is generated, which is found very destructive to the grass; and if you now take off the water, and expose the land, in its wet state, to a severe frosty night,

night, a great part of the tender grass will be cut off. In Gloucestershire, two methods of avoiding these injuries are practised; one is, to take the water off by day, to prevent the scum, and to turn it over again at night, to guard against the frost: the other method is, to take the water off early in the morning, and if that day be dry, to suffer it to remain off for a few days and nights; for if the land experiences only one drying day, the frost at night will do little injury to the grass. The former of these practices, where it is found not too troublesome, is preferable to the latter; and the simply-constructed wears of the above county are well calculated for the adoption of this rule, since any part of them is removable at pleasure, whatever be the severity of the frost. About the middle of this month, the floater

c c

begins

begins to use the water rather more sparingly than in autumn or winter, for his chief object now is to encourage or force vegetation.

At the beginning of the month of March, the crop of grass on the old floated meadows, will generally be sufficient to afford a good bite to any kind of farming-stock, and the water is taken off for nearly a week, that the land may become dry and firm, before the heavy cattle are admitted. It is proper, in the first week of eating off the spring-feed, if the season be cold or rainy, to give the cattle a little hay in the evening, to intermix with their moist food. Some farmers, very discreetly, give the spring-grass of their meadows to their ewes and lambs, in the same manner as a crop of turnips is given to sheep, by allotting

ting them a certain portion each day by means of hurdles or flakes, with hay at the same time. This is certainly making the most of the grass, and an excellent method of fining and sweetening the future herbage.

In the month of April, the grass of these meadows should be eaten off as close as possible, but never later; for if you trespass upon the month of May, the hay-crop will be much impaired; the grass will become more soft and woolly, and have more the appearance and quality of latter-math hay, than hay of the first crop.

At the beginning of the month of May, the water is again thrown over the meadows for a few days, which, as a mere

wetting of the land, will, in the driest of seasons, insure the hay-crop; will insure, in the course of six or seven weeks, a ton and a half of hay upon an acre, which is as much as will be desired by any person who pays a due regard to the quality of his hay. The water is sometimes again used, when the hay is carried off; this however will depend upon circumstances, and is to be done at the discretion of the proprietor, who will take care that sheep do not eat the latter-math. Before the end of the month of June, if the weather be not very unfavourable, cut the hay-crop of your watered-meadow.

We hear of instances, in other countries, of two or more crops of hay having been obtained, from the same watered-meadow, in the space of one year; but, in this island,

island, the man who consults the good of his land, or eventually his own true interest, will be contented with one hay-crop in each year.

Answers to Objections.

IT may not be improper, before I finish my remarks on this subject, to make some reply to a few objections which are too often made to the practice of floating. The most weighty of these objections, is the expense necessarily incurred in executing the work, and the waste of land in cutting so many wide ditches. To both these objections, one satisfactory answer, I presume, may be given: that although even a fourth part of a meadow be consumed in ditches, yet if the remaining three shall produce at least twice the crop which the whole land before produced, there is no room for complaint either of loss of land, or that three or four pounds

per

per acre, have been expended upon the formation of the meadow.

Another objection arises from an apprehension, that this use of the water will give encouragement to the growth of rushes. In answer to this objection I can say that the effect is found otherwise; for this practice is never known to propagate rushes; and in land where they before prevailed, by the very frequent occurrence of its deep drains, it tends powerfully to check and to destroy them. The manure, likewise, which it annually affords to the land, is an enemy to rushes, by making them more palatable to cattle and sheep.

Another objection to this practice, takes its origin from a supposed inferiority in the quality of floated-meadow hay. This inferiority, however, is not so much the
fault

fault of the land, as of the occupier of it ; for many farmers, too attentive to *quantity*, suffer this quick-growing grass to remain uncut till it will produce nearly three tons to an acre ; and then it naturally will become long, coarse, and dry, and little better than straw. But those farmers who are wise enough to cut their grass in the month of June, and who have been fortunate enough to have used muddy-water in the winter, will find their hay very little inferior in quality to the best upland hay. The couch-grass and the meadow fox-tail are, I must grant, very prevalent grasses in a watered-meadow, and their herbage is rather coarse and dry ; but the *poa trivialis*, or rough-stalked meadow-grass, is, in general, still more prevailing than either of the above, and makes ample amends for their degree of coarseness.

There

There remains another objection, or rather obstruction to this art, still unmentioned, which, in many situations, operates as a prohibition; I mean the entire power over the water, which is too often possessed by the proprietors of mills. This exclusive claim, to the great detriment of the community, prevents the improvement of numberless acres; but this objection, one would hope, will, ere long, be removed by the adjusting interference of parliament.

I have thus thrown together the sum and substance of all that I have seen, heard, and read on the subject of watering or floating meadow-land; and if what I have here written, shall in any degree tend to give a clearer conception of the true practice than has hitherto been conveyed, or shall induce any one to try the

extent of the advantage to be derived by floating from a large and rapid river, I shall at least feel that I cannot be deemed an unpardonable intruder on the present occasion.

I shall think it my duty to give any further explanation or information in my power ; and if any one, imagining that he has a considerable tract of land capable of being thus improved, and yet suspecting that difficulties may occur, which he himself may not be able to surmount, be desirous that I should send him a Gloucestershire floater, I shall be happy in executing such a commission. The floaters usually charge a guinea per week and their board ; and will not only take an active part in the manual labour, but will give instructions to as many men as it may be thought fit to employ under their direction.

I shall

I shall have no objection to try any experiment upon my little meadow, that may be recommended to me on rational grounds.

I shall be happy in giving to any gentleman, or farmer, who resides within a fair day's ride of me, all the advice and instruction that I am master of, upon the spot, either respecting the capability of adoption, or the manner of executing the art of Floating.

FINIS.







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