

no reasonable doubt that the extent to which immature sires are used gives this unfortunate practice a long lead in not only barring the way to higher attainment, but also in lowering the standard of achievement.

Loss of stamina is one of the most common forms in which deterioration shows itself in animals under domestication, and the more artificial the conditions the more difficult it is to prevent deterioration. It should be a constant study with the breeder how this stamina can be maintained. But his efforts in this direction will not be completely successful so long as he uses immature sires, for it is impossible that immaturity should possess stamina otherwise than in the unfoldings of partial development; as compared with stamina in the matured animal. What is not possessed cannot be imparted;



MOLLY MILLICENT.
FIRST AT THE ROYAL, 1888, 1889 AND 1890.

hence the use of immature sires is antagonistic to robustness of constitution.

The evils arising from this source would have been much greater but for the fact that in a majority of instances the immaturity in the parents has been only on the side of the male. It is a fact that dairymen are not desirous of rearing the calves of young and immature heifers for future use in the dairy. Experience has taught them that it is unwise to do so, and yet they seem quite content to rear females for the dairy, the get of immature sires.

Tuberculosis is very prevalent among domesticated animals. Artificial conditions are largely responsible, but none of these has, it is thought, been so potent in paving the way for tuberculosis as the use of immature sires. An impaired stamina, a weakened vigor, and degeneracy in robustness, all pave the way for the grasp of this insidious destroyer.

It would be taking extreme ground to claim that immature sires should never be used. There may be a necessity for using them sometimes, and when far on the way to maturity they may doubtless be freely used, and with perfect safety; but this is altogether a different thing from using immature sires as the rule rather than the exception. It would be impossible to say how much higher the attainment would have been in the improvement of the various breeds of live stock had this question received that attention which its importance demands from the first dawn of live stock improvement in modern days.—*Rural World, England.*

The Bull Conveys Abortion.

SO SAYS PROFESSOR BANG.

During the year just closed Professor Bang has collected a considerable mass of evidence from his colleagues in Denmark all pointing to the importance of the part played by the male in the spread of abortion. This has been assimilated for the *N. B. Agriculturist* by a foreign correspondent, who gives the following samples, which must serve to illustrate the nature of the whole:

1. A farmer, who for eleven years had no case of abortion in his herd, lent the use of his bull to a neighbor in whose herd the disease was prevalent. Every cow subsequently served by that bull aborted, including several on a third farm which had been put to him. The bull was sold, the cows were disinfected with lysolium or "ereolin" solutions, and the disease disappeared. Two years have since elapsed without a further case occurring.

2. In this case, fifteen cows belonging to a farmer, whom we may distinguish as A, aborted during 1897. In the spring of that year A sold his own bull, and from that time up to February, 1878, obtained the services of a neighbor's whenever the aborted cows came in season. In the meantime this neighbor, whom we call B, was also lending his bull's service to a third farmer, C. Neither B nor C had ever had a case of abortion hitherto, but in 1898 their cows began to calve prematurely. Up to July, 1898, nine of B's and twelve of C's had aborted. A few others belonging to B, which had also been served by the bull after he had become infected, went their full time; but in C's case every one of the twelve served after the bull had been among A's cows aborted, and none of the others.

3. Two neighboring farmers, each with about twenty-five cows, for many years kept each his own bull. One of them, Mr. S., had never had a case of abortion; the other had been troubled with it for three or four years. One day Mr. S. sold his bull, and for thirteen of his cows hired his friend's. The following year every one of those thirteen aborted, the rest of the herd, which had been served by Mr. S.'s own bull before it was sold, calving at the proper

time. Abortion took place when the "foetus was as large as a cat or a dog." This happened two years ago. On his veterinary surgeon's advice Mr. S. decided not to use his neighbor's bull any more, and subjected his cows to Brauer's treatment. Since then only two cases of abortion have occurred in his herd.

Those and many similar instances reported afford strong presumptive evidence in support of Professor Bang's views regarding the bull's part in this plague. At the same time we are warned not to forget the possibility of other modes of infection, especially that where the bacillus is conveyed by the discharge of an aborted cow coming in contact with the vulva of another. In fact, Professor Bang has already shown that abortion may be produced by contaminating the vaginal passage of a pregnant cow with matter containing the bacilli of abortion. It is, however, more likely for infection to occur when the bacillus is conveyed well into that passage by the bull at the very time when it is open for the reception of the seminal fluid.

Advantages of Early Maturity.

In an article in the *Journal* of the Board of Agriculture, summarizing the results in early maturity experiments, conducted at Iowa Experiment Station by Mr. C. F. Curtiss, the following remark occurs: "The law of diminishing returns for food consumed as animals advance in age toward maturity is conclusively established, and should be kept in mind by the meat producer, since economy of production is one of the important factors in the determination of profit, and the advantages are all with the young and growing animal as compared with one that has practically attained its growth." There is an important lesson for stock feeders and graziers in this pregnant observation.

FARM.

Fall Wheat and Clover Saved from Heaving.

A NEW AND EFFECTIVE SYSTEM OF SURFACE DRAINAGE.

The matter of securing a good stand of clover or fall wheat, especially in clay land, has resolved itself into a question of considerable moment. Especially is this true since the value of clover as a feeding and fertilizing crop has become recognized, and also because the fall wheat crop, where it is grown, holds a most important place in the rotation, and also aids in establishing clover meadows, as no grain crop is so favorable to the securing of a catch of clover seed. While the extraordinary severity of the past winter had much to do with the destruction of these crops, by far the greatest destruction has taken place on lands that hold surplus water near the surface. This is easily accounted for, since we are aware that the action of frost on water or wet substances is to expand them, and in so doing severs the fibres of the roots. The remedy in such a case is to remove as much as possible of the surplus water, which is especially difficult in clay, owing to the lack of porosity of the soil. While underdraining is the great power, the expense of doing it thoroughly on clay soil prevents very many from undertaking it. The result is the crop is very uncertain, and too often a failure.

On any soil, but especially clay, that has not been underdrained, as much as possible should be done to allow the surface water to escape, especially from land where fall wheat or clover are expected to be taken the following season. Our forefathers recognized the value of thorough surface cultivation, and to that end plowed the soil in narrow lands, well raised in the center, leaving a good deep furrow between them. Since the advent of reaping and mowing machinery the tendency has been to plow wider lands and leave shallower open furrows, until we find on many even clay farms that no provision is left for the escape of superfluous water. This we believe is responsible for much of the destructive winter-killing of clover and wheat, as we invariably see the greatest destruction has taken place in the wettest parts of fields, except perhaps on knolls that presented a poor appearance before winter set in, and which, being bare of snow, were exposed to the severe frost. It should, then, be our effort not only to underdrain as far as practical, but also to leave the surface in the best possible condition to allow the water to run off as quickly as possible. Since learning by correspondence and observation of the extraordinary destruction to wheat and clover that has taken place during the last winter, we, like many others, have felt particularly anxious to learn of any system whereby this tremendous loss and disappointment may be averted in future, and it was this anxiety that led us to visit the clay farm of Mr. John Edmonds, on Hamilton Mountain, whom we had learned has adopted a system of surface drainage whereby his fall wheat and clover have come out this spring in almost perfect condition. Our visit was made on May 2nd, just when all the live plants had commenced to exhibit vitality, so that we had good opportunity of comparing fields treated by the ordinary level culture and those managed under Mr. Edmonds' new system.

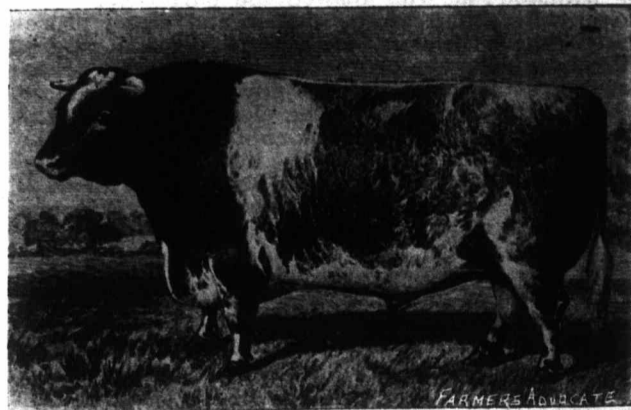
To describe the system in brief, it is to put up the soil in narrow lands, without leaving objectionable, deep, wide furrows between them. The work might possibly be done about as well by a prize plowman, but even then there would be found difficulty in securing the regular smooth slope from

ridge to furrow that characterizes Mr. Edmonds' fields at the present time. The work is done by plowing the field into fourteen-foot lands, and after working it down almost ready for the seed he shapes the lands into beautifully smooth, rounded form by means of a machine of his own invention, which he calls a "land shaper." It consists of a V-shaped scraper, fitted with a point similar to that of a double mouldboard plow, and having wings which slope out until they are fourteen feet apart at the tips. On these wings, which are about four inches deep, is riveted a sheet iron top dipped in the center to the shape the land is to be. The "shaper" is on two wheels, and also has a sharp-edged wheel running near the back, much like a rolling coulter, to prevent the machine from swaying from side to side. It is drawn by two horses, or three may be needed if much earth has to be moved from the furrow to the ridge. The sheet iron covering or table is to shape the land, and also to prevent the soil falling over the wings or scrapers. The machine is used the last thing before sowing the wheat, and after the sowing is done a much smaller similar machine is used to clean out the furrow and spread the soil that it moves evenly over the surface, so as not to prevent surface water running immediately into the furrow. The wheat field put up in this way is quite heavy clay, and not underdrained, presents a hopeful appearance for a good crop. The clover field also, not of '98, but of '97 seeding, is a thick mat of nearly all clover over the entire field, with the exception of a few small parts of lands that were left a little too level. We noticed clover in adjoining fields, especially in the lower portions, that was lifted out almost entirely, and in a hopeless condition. Mr. Edmonds goes over all his clover fields in the fall with the small shaper, cutting a V-shaped groove between the lands, which leaves the ground bearing the plants high and dry, and, therefore, safe from heaving out. Since, by common consent, a man who causes two blades of grass to grow where one grew before is a benefactor to the human race, we feel that Mr. Edmonds is entitled to some deed of gratitude by having demonstrated so clearly a method of overcoming the expensive uncertainty of securing regular crops of fall wheat and clover.

Spraying Wild Mustard.

The following is a brief account of an experiment conducted last year by Mr. Ovens, of Torr, on behalf of the Lancashire County Council, in a field badly infested with charlock. Professor Campbell, under whose direction the experiment was conducted, could not find a field badly enough infested in the County Palatine, but Mr. Ovens was, unfortunately, able to supply the deficiency in a very marked degree.

The field selected was under oats after lea. A portion containing 110 square yards was reserved for spraying, and another, portion of equal extent, was left unsprayed for comparison with it, and the remainder of the field was gone over with a "charlock" weeding machine. The spraying took place on 14th June, when the oats were fully twelve inches in length, and the material used was a solution of sulphate of iron, diluted to 13 per cent. A remarkable result was obtained. The "charlock" was totally destroyed, and in a few days the contrast between the two plots was striking to a degree. Where the spraying had been performed the field bore a dark green hue, while the unsprayed plot was quite yellow, with charlock in full flower. This is conclusive enough as regards the destruction of the charlock, but the important question remains, What effect had the spraying upon the oats and the clover? It is satisfactory to find that the answer here is equally conclusive. The oats were practically uninjured, and the result in the harvest was



FIELD MARSHAL (47870).
BRED BY AMOS CRUICKSHANK.

equally good, for the binder got round the sprayed plot without a hitch, while in the other it was being choked at every round on account of the luxuriant growth of the charlock.

Another experiment was carried out in an oat field sown down with clovers and rye grass, and the effect upon these plants is the question raised by our correspondent. Naturally one fears that what destroys charlock may destroy clover, but, so far as the Torr experiment is concerned, this does not appear to be the case. The spraying in this second trial took place when the oats were about 14 inches in length, and two plots were selected—the one getting a 15 per cent. and the other a 20 per cent. solution of sulphate of iron. In both cases