

but it is just a little close in texture, and the size of the frame is small. As already named, the crossing with the Dorking is found to be about the best that can be obtained. A mixture of Game with the Houdan, or with almost any of the French breeds, especially *La Flèche*, will be found very good indeed, and equal to the Game-Dorking. I have seen well-fed Games, the brown-reds especially, with lovely white flesh and skin, and, as the meat is so well placed, and the offal so small in proportion to the weight of the birds, they are really economical fowls, whether pure bred or suitably crossed. A good cross can be made of the Langshan, and most breeds are better for an admixture of Game blood, but those I have mentioned first of all have been proved far and away the best.

Coming last of all to the French breeds, there are more opportunities of crossing with them. They can first of all be crossed with each other, and none can get far wrong in this way. Perhaps the best of all is the putting together of the *Grève* and *La Flèche*. If outside breeds are used, there are the crosses with the Game and the Dorking, as already named, and a suitable cross is with the Langshan, which produces a capital table fowl, large, well made, and good in quality of flesh. With the other Asiatic breeds there is the same trouble as I have already pointed out, and I cannot recommend the use of Asiatics for table fowls, except size is the first point aimed at.

In conclusion, let me urge all who breed cross-bred fowls to use pure ones only, at first, and never the crosses as breeders. This is a rule that ought not to be departed from, if success is to be maintained.

H—England, Aug.

STEPHEN BEALE

The Time to Cut Grass.

EDS. COUNTRY GENTLEMAN.—This is a very important question for the consideration of the farmer, and one which should have received more attention from practical farmers and feeders than it has. The experiments so far conducted to determine this point are hardly conclusive, though they are by no means valueless. One thing they have clearly established is, that farmers must carefully consider the time of cutting hay if they would secure hay of maximum value. The hay crop depends in value upon two things—quantity and quality, and value depends upon the one as much as upon the other. It is comparatively easy to determine quantity; but to determine quality is not so easy. For getting at the quality there are two methods—the scientific and the practical. The first proceeds by means of chemical analyses, and the second by means of actual feeding tests. The latter is the most reliable, but also the most difficult. Allowing grass to stand until quite ripe was formerly much more common than now, when many farmers cut it when in full bloom. These may have gone to the other extreme. So far as period of growth is concerned, grass is cut earlier than clover. Not infrequently the heads of clover are allowed to become quite brown before it is cut. The period for cutting varies with the locality, and it probably should. The kind of grass, the use for which it is intended, the demands of other branches of farm work, and other circumstances should all be considered.

To determine the question, experiments have been conducted for two years at the Pennsylvania State College. The grass was divided into plots, and the plots cut at different stages of growth. The grass from each plot was carefully cured, and weighed when stored in the barn, and again weighed after lying in the barn five or six months. It was also carefully analyzed. Experiments were conducted for two years

with timothy, but with clover only one year. Timothy was cut in only two stages of growth—full bloom, and approaching ripeness. The average time elapsing between the two cuttings was about sixteen days. The experiments showed that the growth during these sixteen days was quite material, making from 113 to 1,083 pounds of dry hay per acre; the average was 546 pounds, or 18.5 per cent, after the period of bloom. When the shrinkage in the barn was considered, it was found that the advantage was again in favour of late cutting. The hay cut when in bloom shrunk 25.7 per cent, after being stored in the barn, while that cut, after the period of bloom, shrunk in weight only 18.8 per cent, on the average. In the first case the shrinkage ran from 14.9 per cent, to 26.5 per cent; in the latter, from 15 to 23.4 per cent.

So far the advantage clearly favoured late cutting, and it was shown that the advantage was quite large. The next step was to analyze samples of grass from the different cuttings. These analyses revealed the fact that the only material difference in the composition of grass in bloom, and grass nearly ripe was the larger percentage of protein in the former. In the early cut hay the relative amount of crude fibre was also larger, while of other carbohydrate matter the larger quantity was contained in the late cut hay. The conclusion arrived at was, that making all due allowance for error, nearly all the increase of weight was due to the growth of non-nitrogenous constituents of the grass, or such compounds as cellulose, starch, and allied substances, while the nitrogenous compounds (protein) increased none, or very little.

The results obtained by the experiments with clover were different in some respects. The clover was cut at three different periods of growth—when the heads were in bloom, when partly dead, and when nearly all dead. The dates of the different cuttings were June 22d, July 3d, and July 19th. The hay was weighed when put into the barn, and then reweighed in five or six months, to know the amount of dry hay. Instead of an increase of hay from the late cutting there was apparently a decrease. It is certain that this was not due to any lack of uniformity in the growth of the field. It was accounted for on the supposition of the decay of the leaves after full bloom, and the loss of the finer parts in curing the older grass. It was found that the quality of the clover steadily deteriorated after the period of full bloom. It was therefore plain that clover should be cut at the period of full bloom. This is the scientific statement of the case, the nutritive value of the hay being determined by chemical analyses.

To present the other (the practical) side of the problem, we can find no better authority than Prof. Sanborn, now connected with the Missouri Agricultural College. Prof. Sanborn is entitled to equal respect with Prof. Gardner, and his opinions are at variance with the results obtained above. As might be expected, the greatest difference relates to the quality of the grass cut at different periods of growth. We should remember that until within the last few years Prof. Sanborn was a radical advocate of early cutting, and therefore his prejudice, if he had any, would have opposed and not favoured the conclusions he has finally reached. His experiments cover several years, and his conclusions are therefore supposed to be more conclusive than those arrived at the Pennsylvania College, as to the growth of grass subsequent to bloom. Prof. Sanborn fully agrees with the Pennsylvania experimenters, except that he has found this growth more marked than they have. One season he found that clover had made no growth subsequent to bloom, when tested at harvest, but the winter-weight revealed a greater shrinkage and a less net weight on the part of the early cut clover, making the gain by late cutting at the rate of 107 pounds per acre. Other trials revealed a notable gain in clover after