

of sugarcane were ascertained by Mr. V. Srinivasan, B. Sc. Ag., (now Agricultural Demonstrator, Shiyali) who also attended the Conference.

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SELECTED ARTICLE

Economy of Feeding Home Grown Berseem to Cattle

By N. C. DAS GUPTA,

Research Officer, Practical Cattle Feeding Research Scheme,

Jhansi, United Provinces.

Farm animals require food for growth, production of milk and performance of mechanical work over and above the amount required for the upkeep of the body. Nearly one half of the feed consumed by an animal is required for maintenance. Insufficient supply of feed naturally results either in a falling off in the production or in the conversion of body substances into products. Hence, it is hardly possible to improve the cattle only by breeding when they are not properly fed.

Requirements of cattle - Food is necessary to supply energy, protein, minerals and vitamins. Energy or fuel is required to maintain body temperature and to support the vital activities of the various organs; protein to repair and build up body tissues or to supply the protein of milk, minerals to form bone, maintain the mineral matter of the body or to supply the requirements of milk. Vitamins are necessary for the efficient functioning of the cells and organs of the body.

The quantity of the nutrients required depends upon the size of the animal and the amount of production expected. However, the yield of production cannot be increased beyond the maximum capacity of the animal by any amount of feed, the capacity as a producer is an individual characteristic.

It is not always possible to supply all the ingredients required only in the form of coarse and bulky fodders, such as hays and straws, as the capacity of consumption is limited. Hence concentrates (grains, oil-cakes, etc.) containing the nutrients in a concentrated form are also necessary to supply the requirements within the limited capacity of intake.

The stock man should understand the requirements of his animals, also the feeding value of the feeds available in the market and what can be raised economically on his holding. Usually the farmers are recommended to feed grains and oil cakes to cattle for better production, but these high priced concentrates are not always economical. With dairy cows, the economy of feeding depends upon the production capacity of the animal. It may be profitable to give purchased feeds to a cow with heavy milk yield when the concentrates are not very high in price, but under Indian conditions where cows are usually low producers such feeds are seldom economical. Similarly for a continuous thrifty growth only a limited allowance of concentrates can be made. In such cases, legumes may provide the most economical ration. *Guar*, soybean, *urid* or *mung* during the *kharif* and *senji*, *shaftal*, lucerne and berseem in the *rabi*, season are suitable leguminous crops.

Protein rich feeds for dry months From July to November the proper feeding of cattle is easy as there is considerable growth of herbage rich in protein. In winter months the grazing is scarce and the quality of herbage available is poor. This shortage of fodder both in quantity and quality can be minimized if suitable fodder crops rich in protein such as berseem, oats or *sanje* are grown. Practically no grazing is possible during April to June, the dry months preceding the monsoon. Moreover, it is difficult to have any fodder crop during this part of the year and the cattle have to depend largely on straw. Provision of feeds rich in protein is essential for this season if animals are to be maintained in proper condition: this can be done either by purchased concentrates or by preserving some legumes as hay or silage. Legumes, if properly cured as hay or converted into silage, can always provide a good feed for cattle during the months of scarcity.

Berseem or Egyptian clover contains on an average 18 per cent crude protein and 15 per cent digestible protein on a dry basis. It is relished by cattle and as it has no injurious effect when moderately large quantities are fed, it may be used as the source of protein for reasons of economy.

A cow weighing 800 lb, and yielding 10 lb. of milk per day requires about 0.51 lb. digestible protein for maintenance and 0.51 for production and is capable of consuming about 24 lb. of dry matter. This total requirement of digestible protein is available from 34 lb. of green berseem containing about 6.8 lb. of dry matter. Thus, though berseem is a bulky feed, it can conveniently supplement the protein requirement.

Berseem is very rich in minerals, containing on an average about 12.7 per cent soluble ash. The calcium content is very high compared to other feeds, being about 2.8 per cent and although it is not rich in phosphates the average percentage of 0.5 is usually higher than those of other coarse fodders.

Curing of berseem as hay Excellent hay can be prepared from berseem if proper care is taken. Berseem yields a heavy crop under favourable conditions and any excess of green berseem can easily be preserved as hay. Leaves contain much more protein and minerals than the stem, and in the case of berseem the mechanical loss by shattering of leaves during hay making is important. Hence special care should be taken to prevent this loss while curing. This green stuff should be spread in thin layers, as far as possible close to the place of storage, and every morning the whole lot should be turned to expose the lower layers to the sun and stored before it is completely dry and brittle. It is always necessary to handle the stuff early in the morning.

Green berseem can yield on an average about 15 to 20 per cent hay by weight. The yield depends upon the moisture content of the green stuff. During March 1939 about 124 md. of hay were prepared from 625 md. of green berseem at Bharari Farm (Jhansi). The quality obtained was satisfactory and the loss of leaves by shattering was not large as the total protein content of the green berseem was reduced from 16.50 to 14.62 per cent only on a dry basis after conversion into hay. Hence, it may be possible to replace concentrates also by berseem hay for the economic feeding of cattle.

The composition is not always the criterion for the true value of a feed. Marked differences are found in the efficiency of protein from different sources. Moreover, berseem is lower in energy content than grain and oil cakes and its comparative feeding value can be assessed only by the results obtained from feeding trials.

Green berseem for growing heifers To study the feeding value of berseem for growth in comparison with a mixture of barley, linseed cake and wheat bran,

heifers receiving the recommended amount of the mixture were distributed into three groups. One group was allowed to continue the regular concentrate feed; for the second group half the protein of the concentrate was replaced by an equivalent amount of berseem and for the third group three-fourths was replaced by berseem. Coarse fodder for all the animals was the same. The tests were carried out with Hissar and Murrah breeds. Better growth was obtained in the group receiving the full ration of concentrates. The groups in which concentrates were replaced to the extent of 50 per cent and 75 per cent did not show any significant difference between themselves but were significantly inferior to the animals getting their full concentrate ration.

During the 17 weeks of experiment the Hissar heifers getting concentrates gained 155 lb. and those of the second and third groups increased in live weight by 122 and 125 lb. the daily gain being 1.30, 1.03 and 1.05 lb. for the three groups respectively. The total live weight increase for the Murrah heifers on the other hand, was 184, 131 and 115 lb. respectively. The difference in the gain in the case of Murrahs was more pronounced than in the case of Hissars, being 1.55, 1.10 and 0.97 lb. per day respectively. The above results were confirmed by a similar test conducted with a large number of animals. The live weight increase with replacement of concentrates by berseem was lower than that of the animals getting an ideal concentrate ration, which might be due to the lower energy content of berseem. But the gain per day of 1.05 lb. in the case of Hissar and 0.97 lb. in the case of Murrah with the highest replacement by berseem is quite satisfactory and compares favourably with the normal growth rate of cattle.

When economy of production is taken into consideration the maximum replacement of concentrates by home grown berseem gives the best return. The average cost of the total feed for production of 100 lb. increase in live weight for both the breeds with the three different rations are Rs. 15.54, 14.00 and 11.27 respectively.

Milch cattle on green berseem Experiments on similar lines were conducted with milch cattle. One lot of cows obtained their full requirement of protein as concentrates, the second lot received it in the form of half concentrates and half green berseem and the third lot in the form of one fourth concentrates and three fourths berseem. During the period of experiment, which lasted for about four months, *the berseem rations had no detrimental effect on the conditions and general appearance of the cows and produced nearly the same quantity of milk of almost identical composition.* This test was repeated with large numbers of animals and the above findings were confirmed.

The cost of producing milk decreased with increased replacement of concentrates by berseem. The average cost of the feed for both Hissar and Murrah breeds getting the three rations was Rs. 1.55, 1.37 and 1.12 respectively per md. of milk.

The economical value of the different rations was calculated from the intake and the cost of the roughages, green berseem and concentrates fed during the experiment. The grains and oil cakes were valued at the average market price at the time of the experiments, and the cost of berseem was arrived at from the actual cost of raising the crop on the respective farms where the experiments were conducted. For the growth test which was conducted at Madhurikund Farm (Muttra), green berseem was valued at Re. 0.118 per md. and for the milk test at Bharari Farm (Jhansi) the rate of green berseem was found to be Re. 0.144 per md. The lower cost of green berseem at Madhurikund was due to higher yield. The price of concentrates fed to heifers was Rs. 2.725 per md. and of that fed to cows Rs. 2.125 per md.

Berseem hay for thrifty growth Eighteen heifers, nine Hissars and nine Murrahs were distributed into three comparable groups according to age and live weight. The average age of the Hissar heifers was about a year and a half and that of Murrahs about one year. The average body weight of an animal in each group was 361 lb at the beginning of the test. All the animals received wheat *bhusa* and green *jowar* for the roughage portion of the ration. One group was supplied with a mixture of linseed cake, wheat bran and crushed barley for concentrates; for the second group one half of the required concentrates was replaced by berseem hay on the basis of protein content; three fourths was similarly replaced by berseem hay for the heifers of the third group.

During the 17 weeks of experiment the total increase per animal in body-weight for the different groups was 175, 148 and 128 lb. for Hissar heifers and 187, 128 and 116 lb. for Murrah heifers for the three feeds respectively. Thus the average total increase for both the breeds was 181, 153 and 127 lb., the average gain per day being 1.52, 1.29 and 1.07 lb. respectively. The increase in weight with full concentrate ration was the highest, followed by that with 50 per cent concentrate and 50 per cent berseem hay, while the gain in the group where three fourths of the concentrates was replaced by berseem hay was minimum. However this minimum increase of 1.07 lb. per day with the highest replacement of concentrates compares quite favourably with the normal growth rate of cattle of the same age. It may be mentioned here that according to Morrison the gain during the second year averaged 1.16 lb. per head daily for Guernsey, 0.89 lb. for Ayrshire and 0.79 lb. for Jersey.

The total expenditure on the feed was calculated to find out the comparative cost of growth by the three rations. The concentrate mixture as mentioned before was priced at Rs. 2.725, and the cost of berseem hay was found to be Rs. 0.79 per md. The price of wheat *bhusa* and green *jowar* which were common to all the animals was taken to be 8 as and 2 as per md. respectively. The average expenditure for 100 lb. gain in body weight was Rs. 13.23, 11.51 and 11.85 with the different rations, the cost with the 50 per cent replacement of concentrate by hay being minimum.

Berseem hay for milk production The Murrah buffalo cows selected for this test were fed the control ration before they were distributed into three groups of comparable age, days in lactation and initial milk yield. Of the three rations compared, the control ration consisted of full concentrates as in the case of experiment for growth. The second ration consisted of half berseem hay and half concentrates to supplement the total protein requirement and the third three-fourths hay and one-fourth concentrates. The average total milk yield of a cow during 11 weeks of experiment was 15.81, 16.00 and 12.74 md. respectively. There was no difference in milk yield with the full concentrate ration and when half the concentrates were replaced by berseem hay, but the milk yield with the highest replacement was lower. No appreciable variation in the composition of milk due to the different feeds was noticed. The animals of different groups maintained their live weight quite satisfactorily. There was no difference in the general appearance and condition of the animals.

The cost of feed for the period of experiment was Rs. 31.13, 27.90 and 24.31 for the three rations and so the cost of production of milk was Rs. 1.97, 1.75 and 1.91 per md. The milk produced was quite satisfactory and economical up to the extent of 50 per cent replacement of grain and cake mixture by berseem hay.

Economy of home grown berseem For both milk and growth the cost is lower when grain mixture is replaced by green berseem. There is no significant variation in milk yield when an ideal grain and cake mixture is replaced to the extent of 75 per cent by green berseem. For growth a well balanced mixture is more efficacious than berseem, but even when 75 per cent of concentrates is replaced by berseem the average rate of growth is quite satisfactory.

The curing of berseem as hay provides an easy and economical means of supplying quite a rich feed during the dry season. Though berseem hay is not as efficacious as an ideal concentrate mixture, it is quite an efficient feed at a low cost both for growth and milk production.

When the main problem of the country is to cut down the cost of feeding cattle and at the same time to get the maximum possible return, the cultivators will act wisely if they feed enough home grown berseem to their animals with a small amount of grain or other by-products which they can spare without purchasing. *Indian Farming Vol. 4, Aug. (1943).* *

Gleanings

The more Food the Less War Commonwealth and States are united in a campaign to foster food consciousness on the part of producers, consumers and all who are in any way concerned with food consumption or production.

It is not an easy task to convince consumers that they must be prepared to do without certain foodstuffs, and suffer rationing of others.

Nor is it less difficult to continue effectively to urge the farmer to greater efforts in view of his achievements to date, and in face of the many obstacles which still remain in his path—shortages of labour, machines, materials and transport. Assurances have been given that the rate at which those obstacles are being removed will be accelerated, even if manufacturers find it less profitable to produce farm requirements than munitions.

If consumers, producers and manufacturers would accept as their slogan: "The more food, the less war", there would be less inclination than at present for consumers to complain of what are, after all, trivial inconveniences, less insistence by farmers for the total removal of all obstacles before knocking down to the real task, and greater celerity on the part of manufacturers in changing over their operations to the now more important food front.

The old question: How are we going to win the war? has now given way to "How long will it take us to win?" The answer to this latter question depends perhaps more upon an abundance of food than upon anything else. Let us set about shortening the war by not only producing in abundance, but by voluntarily limiting civilian consumption to bare necessities, thus leaving a bigger balance to be "exchanged" with our allies for increased hitting power to batter the enemy into quick and unconditional surrender. (*Agr. Gaz. N. S. Wales, December 1943*)

Better and More nutritive Rice A process that might not only revolutionise rice milling but also be of immense benefit to the masses in India, who suffer from deficiency diseases such as 'beri-beri' is at present under examination by the Food Department of the Government of India. Under this new process, before dehulling rice is placed in a chamber treated with hot water under pressure, drained, dried and then milled in a normal manner. When milled this 'converted' rice yields a grain slightly darker than the ordinary milled rice, but of much greater nutritive value. It is claimed that this 'converted' rice is so hard that weevils are discouraged from attacking it and preliminary laboratory tests confirm this view. The hardness of the grain results in a lower percentage of broken

* [Berseem does not appear to thrive in South India, but lucerne has been known to grow well. Green lucerne is a little richer than green berseem: 100 lb. of green lucerne has 3.24 lb. of digestible crude proteins and 8.3 lb. of starch of equivalent against the respective figures 2.5, and 8.7 for berseem. (*Ed.*)]