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## EFFECT OF FISHMEAL AND WHEAT BRAN DIET ON THE PERFORMANCE OF LOCAL LACTATING COWS IN BANGLADESH

M.A.S. Khan<sup>1</sup>, F. Dolberg<sup>2</sup> and M.A. Akbar<sup>3</sup>

### Abstract

*Nine local (indigenous) Zebu cows of average body weight 156 kg were used to examine the performance in their first lactation given either fishmeal or wheat bran diets. Fishmeal diet (A) consisted of 11.5 kg urea treated straw, 4 kg green grass and 0.25 kg of fishmeal. This diet contained an estimated 63 MJME, 518 g of rumen degradable protein (RDP) and 146 g of undegraded dietary protein (UDP). The wheat bran diet (B) consisted of 11.6 kg urea treated straw, 4 kg green grass and 0.5 kg wheat bran. This diet contained an estimated 66 MJME, 523 g of RDP and 91 g of UDP. Total dry matter intake of the two diets, A and B were 7.5 and 7.83 kg/d respectively. Therefore, the two diets differed mainly in UDP levels. The experiment began in the 39th week of lactation and continued for 19 weeks. Mean results for cows on diets A and B respectively were : daily milk yield (kg) 0.75 and 0.71, butterfat content (g/kg) 79 and 75, milk protein content (g/kg) 52 and 47, daily weight gain (kg) 0.16 and 0.12. None of the differences between treatments was significant ( $P > 0.05$ ). The results of the experiment suggest that replacing fishmeal with wheat bran has no significant effect on the performances of local lactating cows, but biologically it appears to be more effective since all the mean values were higher for the fishmeal diet. The cost of wheat bran diet (USD 0.25/d/cow) was cheaper than that of fishmeal diet (USD 0.31/d/cow) and net return in terms of money by selling milk is slightly higher in wheat bran diet (USD 0.30) than that of fishmeal diet (USD 0.31) in comparison with feed cost.*

### সারসংক্ষেপ

মাছের গুড়া ও গমের ভূষি মিশ্রিত খাবারের কার্যকারিতা পরীক্ষা করার জন্য প্রথমবার বাচ্চা দেয়া ৯টি দেশী গাভী (১৫৬ কেজি) কে দিয়ে একটি গবেষণা কাজ চালানো হয়। মাছের গুড়া মিশ্রিত খাবার

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যা ১১.৫ কেজি ইউরিয়া প্রক্রিয়াজাত খড়, ৪ কেজি সবুজ ঘাস এবং ০.২৫ কেজি মাছের গুড়া দ্বারা গঠিত। এই খাবার আনুমানিক ৬৩ এমজে এমই, ৫১৮ গ্রাম বড় পাকস্থলীর ভংগুর আমিষ এবং ১৪৬ গ্রাম বড় পাকস্থলীর অভংগুর আমিষ দ্বারা গঠিত। অন্যদিকে গমের ভূষি মিশ্রিত খাবার ১১.৬ কেজি ইউরিয়া প্রক্রিয়াজাত খড়, ৪ কেজি সবুজ ঘাস এবং ০.৫ কেজি গমের ভূষি দ্বারা গঠিত। এই খাবার আনুমানিক ৬৬ এমজেএমই, ৫৩৪ গ্রাম বড় পাকস্থলীর ভংগুর আমিষ এবং ১১ গ্রাম বড় পাকস্থলীর অভংগুর আমিষ দ্বারা গঠিত। মাছের গুড়া ও গমের ভূষি মিশ্রিত খাবারের কঠিন পদার্থ গ্রহণের পরিমাণ ছিল প্রতিদিন যথাক্রমে ৭.৫ এবং ৭.৮৩ কেজি। সুতরাং ২টি খাবারকে প্রধানতঃ বড় পাকস্থলীর অভংগুর আমিষের পরিমাণের উপরে পৃথকীকরণ করা যেতে পারে। দুটি খাবারের উপরে উক্ত গবেষণাটি গাভী বাচ্চা দেয়ার পরবর্তী ৩৯ সপ্তাহে আরম্ভ করে তা ১৯ সপ্তাহ পর্যন্ত চালানো হয়েছিল। মাছের গুড়া ও গমের ভূষি মিশ্রিত খাবারের গড় ফলাফল ছিলঃ প্রতিদিন দুধ উৎপাদন (কেজি) ০.৭৫ এবং ০.৭১, দুগ্ধ চর্বি (গ্রাম/কেজি) ৫২ এবং ৪৭, প্রতিদিনের ওজন বৃদ্ধি (কেজি) ০.১৬ এবং ০.১২। দুটি খাবারের মধ্যে কার্যকারীতার পার্থক্য পরিসংখ্যানগত বৈশী ছিল না। এ গবেষণার ফলাফল থেকে এটাই প্রমানিত হয় যে দেশী দুগ্ধবতী গাভীতে মাছের গুড়া মিশ্রিত খাবারের পরিবর্তে গমের ভূষি মিশ্রিত খাবারের কার্যকারিতা পরিসংখ্যানভাবে ফলপ্রসূ না হলেও জীব বিজ্ঞানের দিক থেকে চিন্তা করলে বৈশী গড় ফলাফলের জন্য মাছের গুড়া মিশ্রিত খাবার (ইউ, এস, ডি ০'২৫ দিন প্রতি গাভী) তুলনামূলকভাবে মাছের গুড়া মিশ্রিত খাবারের চেয়ে সস্তা (ইউ, এস, ডি ০'৩১ প্রতিদিন প্রতি গাভী) এবং গমের ভূষি মিশ্রিত খাবারের বিনিময়ে পাওয়া বিক্রয় মূল্য (ইউ, এস, ডি ০'৩০) মাছের গুড়া মিশ্রিত খাবারের বিনিময়ে পাওয়া দুধের বিক্রয় মূল্য অপেক্ষা সামান্য কিছু বেশী (ইউ, এস, ডি ০'৩১) যদি তা খাবারের মূল্যের সংগে তুলনা করা হয়।

## Introduction

In Bangladesh locally produced fishmeal is available as a protein source for lactating cows and growing calves and responded very well to fishmeal (Saadullah et al 1981, Orskov and Dolberg 1984, Khan et al 1987, Khan et al 1990b) But some times it is scarce and expensive. Fishmeal may be supplemented by leguminous fodder in the ration of lactating cows (Khan et al 1999 a, Khan et al 1991). In certain period of the year in Bangladesh no legumes are available at all and it is necessary to find out an alternative to protein supplement as concentrate. Wheat bran which can be flour meal by-product throughout the year, may be used for the purpose. With this view in mind, an experiment was carried out to examine the performance of local cows in their first lactation given either fishmeal or wheat bran in their diets. It was expected that the response to fishmeal would be better than that of wheat bran in terms of milk production, due to the presence of more undegraded dietary protein (UDP) in fishmeal, but considering the cost and availability, the degree of response to fishmeal in comparison with wheat bran was the point of interest.

## Materials and Methods

Rations were formulated on the basis of the total energy requirements of the

animals as per Agricultural Research Council (ARC-1980) i. e. the rations were isoenergetic but supply of treated straw to the animals was ad-libitum during the entire experimental period. Fishmeal diet (A) consisted of 11.5 kg urea treated straw, 4 kg green grass and 0.25 kg of fishmeal. This diet contained an estimated 3 MJME, 581 g of rumen degradable protein (RDP) and 146 g of UDP. The wheat bran diet (B) consisted of 11.6 kg urea treated straw, 4 kg green grass and 0.5 kg of wheat bran. This diet contained an estimated 59 MJME, 523 g of RDP and 91 g of UDP. Total dry matter intake of the two diets A and B were 7.5 and 7.83 kg/d respectively. Therefore, the diets differed mainly in UDP levels. The composition and nutritive value of the ingredients and of the diets are given in Table 1 & 2.

Table 1. Approximate composition and Nutritive value.

	DM (g/kg)	ME (MJ/kg DM)	RDP (g/kg DM)	UDP (g/kg DM)	CP (g/kg DM)
Treated straw	524	8	68	8	76
Fishmeal	846	11.1	226	340	566
Wheat bran	886	10.7	103	34	137
Green grass	323	10	49	21	70

Table 2. Composition and nutritive value of the intake diets.

**Diet A**

Ingredients	Fresh wt. (Kg/d)	DM (Kg/d)	ME (MJ/d)	RDP (g/d)	UDP (g/d)	CP (g/d)
Treated straw	11.5	6.0	48	408	48	456
Green grass	4	1.29	12.9	63	27	90
Fishmeal	0.25	0.21	2.3	47	71	118
Total	15.75	7.5	63	518	146	664

**Diet B**

Treated straw	11.6	6.1	48.8	415	49	464
Green grass	4	1.29	12.9	63	27	90
Wheat bran	0.5	0.44	4.7	45	15	60
Total	16.1	7.83	66.4	523	91	614

Nine cows in late lactation and of average body weight 156 kg, were used in this experiment. The cows were paired according to calving date. There were 4 pairs of cows

and remaining one. A cow from one pair was randomly allocated to either fishmeal or wheat bran diet. The extra cow was placed on the wheat bran diet. The experiment began in the 39 th week of lactation and continued for 19 weeks. Milk yield and composition and liveweight of the cows were measured weekly.

### Results and Discussion

The results for milk yield, milk composition, body weight gain, the feed cost and return are presented in table 3 and 4 respectively. Average milk yield, butter fat, milk protein and body weight gain of the animals on diet A were the higher than that of animals on diet B. None of the difference between treatments was significant ( $P > 0.05$ ). Total average feed cost per day per animal on the diet A was higher than that on diet B.

Table 3

Parameters	Diet		SED	Significance
	A	B		
Body weight gain (Kg/d)	0.16	0.12	0.042	NS
Milk yield (Kg/d)	0.75	0.71	0.146	NS
Butter fat (g/Kg)	79	75	12.333	NS
Milk protein (g/kg)	52	47	1.726	NS

Table 4 Feed cost and return from the experimental animals  
(Taka/day animal)

Diet	Feed cost	Net profit (by selling milk %Tk. 15 00/kg).
Fishmeal (A)	10.98 (USD 0.31)	11.25 (USD 0.31)
Wheat bran (B)	9.06 (USD 0.25)	10.65 (USD 0.33)

There is no such data available in the literature to compare with the present experimental results specially at the late stage of local lactating cows. But Khan et al (1987, and 1990b) found increased performances (body weight, milk yield and milk composition) of cows when they were fed fishmeal, containing higher UDP. In the present experiment it was of interest to compare the performance of cows given either fishmeal or wheat bran diet. It may be mentioned here that before starting the experiment it was expected that the response to fishmeal would be better than that of wheat bran

due to the presence of more UDP in fishmeal, but considering the cost and availability, the degree of response to fishmeal in comparison with wheat bran was the point of interest. The provision of protein supplement in livestock feeds is often a limiting factor in the productivity of incigenous animals (Prof. Naylor, University of Aberdeen, 1992, personal communication). Similarly, protein is the limiting factor for milk production in our country. Protein itself would stimulate milk production due to stimulation of body fat mobilization. The mechanisms involved are not fully understood (Orskov and Dolberg 1984). The reason for nonsignificant differences in production parameters between two diets of this experiment is not clearly known to authors. However, one of the reasons could be the degradability of protein in fishmeal which has not been done in this experiment due to technical difficulties. UDP content of fishmeal has been estimated according to available literature (McDonald et al 1985). Evidence suggests that degradability of fishmeal varies from 30-70% (Orskov et al 1971). The fishmeal, which has been used in this experiment, probably was having higher degradability than was expected. In that case although UDP content of fishmeal diet as shown in Table 1 is much higher than that of wheat bran diet, but in practice the difference may not be so high. As a result the production parameters were not significantly different between the diets. The results of the experiment suggest that replacing fishmeal with wheat bran has no significant effect on the performances of local lactating cows but biologically it appeared to be more effective since all the mean values were higher for the fishmeal diet. This may probably be due to presence of more UDP in fishmeal. The cost of wheat bran diet (USD 0.25/d/cow) was cheaper than that of fishmeal diet (USD 0.31/d/cow), and net return in terms of money by selling milk is slightly higher in wheat bran (USD 0.30) than that of fishmeal diet (USD 0.31) in comparison with feed cost. Finally, from this experiment it may be suggested that wheat bran may also be used as a supplemented feed of the ration for lactating dairy cattle instead of fishmeal under the existing socioeconomic condition of Bangladesh.

### Acknowledgement

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## INFLUENCE OF VERMICULITE ON GROWTH AND CARCASS CHARACTERISTICS OF WHITE LEGHORN PULLETS UNDER RESTRICTED FEEDING CONDITION

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### Abstract

*The influence of vermiculite on growth and carcass characteristics of White Leghorn pullets was investigated under restricted feeding condition. During experiment the birds were reared on the following treatments : ad-libitum food intake (A), restricted (by 5% from standard requirement) food intake (B), restricted as for treatment B but with 3% diet were replaced with vermiculite (C) and restricted as for treatment B but with 5% diet were replaced with vermiculite (D). Body weight of birds were almost similar between treatment groups. Per unit body weight gain the birds of 5% vermiculite feeding group (D) required 1.7 g of less feed than ad-libitum group (A). At the age of 150 days nine birds from each treatment were killed for carcass analysis. Carcass yield was not affected significantly by different treatments. Weight of liver increased significantly ( $P < 0.05$ ) in vermiculite feeding groups C & D whereas significantly ( $P < 0.05$ ) less abdominal fat was stored in these groups in comparison with birds of group A. Breast meats of vermiculite feed groups contained higher amount of protein and ad-libitum feeding group contained higher amount of fat. Deposition of vitamin A in liver was also higher ( $P < 0.05$ ) in vermiculite feeding groups.*

### সারসর্ম

ভেরমিকুলাইট ব্যবহৃত রসদ সীমাবদ্ধভাবে খাওয়ানোর পদ্ধতিতে সরবরাহ করলে হোয়াইট লেগহর্ন পুলেটের শারিরিক বর্ধন এবং কারকাসের গুণাগুণের উপর কি প্রভাব পড়ে তা নির্ণয় করার জন্য একটি গবেষণা চালানো হয়। গবেষণাকালীন সময়ে নিম্ন ব্যবস্থা অনুযায়ী খাদ্য সরবরাহ করা হয়। গ্রুপ “এ” এডলিবিটাম পদ্ধতি, “বি”—সীমাবদ্ধভাবে খাদ্য সরবরাহ পদ্ধতি, “সি” ও “ডি”—খাদ্য সরবরাহ “বি” এর অনুরূপ কিন্তু মৌল রসদের যথাক্রমে তিন ও পাঁচ ভাগ ভেরমিকুলাইট দিয়ে পূরণ করা হয়। সমস্ত গ্রুপের পুলেটের শারিরিক ওজন মোটামুটিভাবে একই রকম ছিল। প্রতি ইউনিট

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