**CHAPTER-4**

**RESULTS AND DISCUSSIONS**

In Bangladeshthere is a huge gap between demand and availability of feed for livestock. Due to this imbalance, animals are mainly fed on poor quality feed or by products, which are low in energy, protein and other essential nutrients. It is, however, the use of balanced rations consisting of locally available good quality ingredients can bridge gap between the demand and supply, can improve the efficiency of feed utilization and performance of animals.

**EXPERIMENT: I**

Thevariety of feed ingredients used in different dairy farm ration and their nutritional evaluation.

**Table 4.1:** **Chemical composition of different dairy farms concentrate feed rations (%DMB)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Farm | Moisture  | DM | CP | CF | EE | TA | NFE | AIA |
| F1 | 7.20$\pm $0.04 | 92.80$\pm $0.16 | 14.35$\pm $0.15 | 17.5$\pm $0.05 | 2.00$\pm $0.57 | 04.23$\pm $0.01 | 61.92$\pm $1.70 | 3.31$\pm $0.07 |
| F2 | 8.70$\pm $0.32 | 91.30$\pm $0.17 | 13.82$\pm $0.23 | 18.0$\pm $0.57 | 5.00$\pm $0.32 | 05.95$\pm $0.09 | 57.23$\pm $0.99 | 5.20$\pm $0.05 |
| F3 | 7.00$\pm $0.33 | 93.00$\pm $0.07 | 07.18$\pm $0.58 | 11.5$\pm $0.05 | 4.90$\pm $0.66 | 08.55$\pm $0.23 | 67.87$\pm $0.54 | 2.63$\pm $0.90 |
| F4 | 8.50$\pm $0.60 | 91.50$\pm $0.00 | 11.72$\pm $0.33 | 13.5$\pm $0.05 | 2.90$\pm $0.59 | 08.78$\pm $0.75 | 63.10$\pm $1.11 | 4.05$\pm $0.55 |
| F5 | 7.50$\pm $0.04 | 92.50$\pm $0.01 | 11.90$\pm $0.58 | 16.0$\pm $0.73 | 5.00$\pm $1.34 | 09.89$\pm $0.88 | 57.21$\pm $0.32 | 2.75$\pm $0.00 |
| F6 | 7.20$\pm $0.04 | 92.80$\pm $0.23 | 14.70$\pm $0.84 | 14.5$\pm $0.48 | 6.70$\pm $0.97 | 15.45$\pm $1.98 | 48.65$\pm $2.02 | 3.37$\pm $0.32 |
| F7 | 6.60$\pm $0.37 | 93.40$\pm $0.32 | 12.25$\pm $1.34 | 12.0$\pm $0.10 | 4.10$\pm $0.02 | 10.68$\pm $0.77 | 60.97$\pm $0.72 | 7.93$\pm $0.98 |
| F8 | 7.40$\pm $0.19 | 92.60$\pm $0.34 | 12.30$\pm $0.67 | 13.0$\pm $2.66 | 5.10$\pm $0.67 | 10.92$\pm $0.03 | 58.68$\pm $1.03 | 4.51$\pm $0.56 |
| F9 | 7.40$\pm $1.65 | 92.60$\pm $0.54 | 11.38$\pm $0.65 | 12.5$\pm $0.10 | 6.90$\pm $0.08 | 06.51$\pm $0.65 | 62.71$\pm $0.04 | 5.17$\pm $0.74 |
| F10 | 6.80$\pm $0.05 | 93.20$\pm $0.78 | 12.60$\pm $0.76 | 9.50$\pm $0.76 | 7.10$\pm $0.77 | 06.77$\pm $0.44 | 64.03$\pm $0.07 | 5.56$\pm $0.41 |

Each value is the mean of triplicate determination

**4. I .1. Chemical composition of different dairy farms concentrate feed rations**

The Moisture content of the dairy concentrate ration of different farms was found as 7.20, 8.70, 7.0, 8.50, 7.50, 7.20, 6.60, 7.40, 7.40, and 6.80 percent respectively. The value ranged from 8.70 to 6.60 being maximum in F2 and minimum in F7. The Dry Matter (DM) of the dairy concentrate ration of different farms were found as 92.80, 91.30, 93.00, 91.50, 92.50, 92.80, 93.40, 92.60, 92.60 and 93.20 per cent in farm F1, F2, F3, F4, F5, F6, F7, F8, F9 and F10 respectively. The value ranged from 93.40 to 91.30 being maximum in F7 and minimum in F2. The Crude Protein (CP) content were found as 14.35, 13.82, 7.18, 11.72, 11.90, 14.70, 12.25, 12.30, 11.38 and 12.60 per cent in farm F1, F2, F3, F4, F5, F6, F7, F8, F9 and F10 respectively. The Crude Protein of the rations was varied from 14.70 to 07.18 per cent being maximum in F6 and minimum in F3. The Crude Fiber (CF) was found as 17.5, 18, 11.5, 13.5, 16, 14.5, 12, 13, 12.5, and 9.5. The value ranged from 18 to 9.5 being maximum in F2 and minimum in F10. The Ether Extract (EE) of the dairy concentrate rations of different farms were found as 2.00, 5.00, 4.90, 2.90, 5.00, 6.70, 4.10, 5.10, 6.90,7.10 per cent in farm F1, F2, F3, F4, F5, F6, F7, F8, F9 and F10 respectively. The ranges of Ether Extract (EE) of the rations were varied from 7.10 to 2.00 being maximum in F10 and minimum in F1 farm. The Nitrogen Free Extract (NFE) of the rations was found as 61.92, 57.23, 67.87, 63.10, 57.21, 48.65, 60.97, 58.68 and 62.71, 64.03. NFE ranged from 67.87 to 48.65 being maximum in F3 and minimum in F6. The Total Ash (TA) for farms F1, F2, F3, F4, F5, F6, F7, F8, F9 and F10 were found as 4.23, 5.95, 8.55, 8.78, 9.89, 15.45, 10.68, 10.92, 6.51, 6.77 per cent respectively. TA ranged from 4.23 to 15.45 per cent being minimum in farm F1 and maximum in farm F6. The Acid Insoluble Ash (AIA) of the rations were found as 3.31, 5.20, 2.63, 4.05, 2.75,3.37, 7.93, 4.51, 5.17 and 5.56 per cent in farm F1, F2, F3, F4, F5, F6, F7, F8, F9 and F10 respectively and it ranged from 2.63 to 7.93 per cent being minimum in F3 and maximum in F7 farm. The nutritive value of concentrate feeds are close to the value found by Thakur and Tomar (2004); [Tambhale,](http://www.cabdirect.org/search.html?q=au%3A%22Tambhale%2C+G.+V.%22)  *et al.* (2009) and Jakhmola (2005).

The difference in the values of different nutrients in the different farms may be due to the varying ingredients used and physical composition of feed ingredients.

Before going to test whether the ingredients are significantly different in each farm we should check assumptions of samples are. First of all we test that the samples were normally distributed or not. Shapiro wilk test was conducted for every concentration where the test statistic were 0.88, 0.88, 0.85, 0.06, 0.93, 0.93, 0.95, 0.91 and P-value 0.12, 0.11, 0.06, 0.81, 0.41, 0.40, 0.71 respectively which reflects that the samples were normally distributed. Assuming the hypothesis that every concentration of chemical composition is significantly different in every farm.

**Table 4.2: Test of significance of chemical composition of different dairy farms**

|  |  |  |
| --- | --- | --- |
| Concentration | t-value | p-value |
| Moisture | 34.64 | <0.01 |
| Dry matter | 431.56 | <0.01 |
| Crude Protein | 18.36 | <0.01 |
| Crude Fiber | 16.10 | <0.01 |
| Ether Extract | 9.40 | <0.01 |
| Nitrogen Free Extract | 36.49 | <0.01 |
| Total Ash | 8.68 | <0.01 |
| Acid Insoluble Ash | 8.75 | <0.01 |

To fulfill our objective we conducted single mean test where test statistic and p-value were provided in Table 4.2. It was concluded that every concentrate feed were significantly different in every farm. The difference in the values of different nutrients in the different farms was due to the varying ingredients used and physical composition of feed ingredients.

**Table 4.3: Percentage distribution of farms regarding to use ingredients**

|  |  |  |
| --- | --- | --- |
| Ingredients | Farms | Percentage of used ingredients farm |
| **Used** | **Not Used** |
| Wheat bran | 10 | 0 | 100 |
| Pea bran | 6 | 4 | 60 |
| Rice polish | 9 | 1 | 90 |
| Jaur | 1 | 9 | 10 |
| Mosur hulls | 8 | 2 | 80 |
| Gram chuni | 2 | 8 | 20 |
| Broken maize | 8 | 2 | 80 |
| Broken pea | 2 | 8 | 20 |
| Chira Kura | 4 | 6 | 40 |
| Mug powder | 9 | 1 | 90 |
| Oil cake | 6 | 4 | 60 |
| Flour | 5 | 5 | 50 |
| Soybean | 4 | 6 | 40 |
| Vitamin mineral premix (V.M.P) | 2 | 8 | 20 |

From the Table 4.3 it was clear that “Wheat Bran” were used in 10 farms in total of 10 (100%) where as ingredient “Rice polish”, “Mug powder” were being used in 9 farms among 10 no of farms (90%). “Mosur hulls” and broken maize were used in 8 farms among 10 (80%), “pea bran and oil cakes were used in 6 farms out of 10 farms (60%). Flour was used in 5 farms among 10 farms (50%). Chira kura and soybean were used in 4 farms out of 10 farms (40%). Broken pea, gram chuni and V.M.P were used in 2 farms (20%). Jaur was the ingredient that was found only a single farm. A chi-square (χ2) test was used to examine the equality of observed proportions for using ingredients in different farms. The result observed that there were significant difference among the observed proportion for using ingredients (p-value<0.01). The difference is due to the availability, economic and production status of the farm.

**Table 4.4: Number of different ingredients used in different farms**

|  |  |
| --- | --- |
| Farms No. | Total no. of ingredients used |
| F1 | 11**a** |
| F2 | 08**c** |
| F3 | 08**c** |
| F4 | 07**d** |
| F5 | 06**e** |
| F6 | 09**b** |
| F7 | 06**e** |
| F8 | 07**d** |
| F9 | 06**e** |
| F10 | 08**c** |

Among the total 10 farmsthe farm no. F1 used 11 types of different ingredients and ranked as “a”. The F6 farm used total 9 different ingredients and is categorized as ranked “b”. Farm number F2, F3, and F10 used 8 types of different ingredients and were ranked as “c”. Farm number F4 and F8 used 7 types of different ingredients and ranked as “d”. Farm number F5, F7 and F9 used 6 types of different ingredients and were ranked as “e”. A chi-square (χ2)test was used to examine the equality of observed proportions for using ingredients in different farms. The result observed that there were significant difference among the observed proportion for using ingredients (p-value<0.01). The difference is due to the availability, economic and production status of the farm.

**Table 4.5: Amount of concentrate feed offered in individual farm in regard to milk production.**

|  |  |
| --- | --- |
| Farms | Amount of concentrate feed offered(Milk : Concentrate feed) |
| F1 | 1:1 |
| F2 | 1:1 |
| F3 | 1.8:1 |
| F4 | 2.5:1 |
| F5 | 1:1 |
| F6 | 1.3:1 |
| F7 | 1.4:1 |
| F8 | 1.4:1 |
| F9 | 1:1 |
| F10 | 1:1 |

The amount of concentrate feed offered in relation to milk production is similar in F1, F2, F5, F9 and F10 farms were similar as they offered 1kg concentrate feed for 1kg of milk production although they vary nutritionally. Farm F6 provided 1kg concentrate feed for 1.3 kg of milk production. Farm F7 and F8 offered 1kg concentrate feed for 1.4 kg of milk production. Farm F3 was provide 1kg concentrate for 1.8 kg of milk production. The farm F4 provided 1kg concentrate feed for 2.5 kg of milk production. The amount of feed offered in relation to milk production is may be due to difference in nutritional values of feed ingredients in total mixed ration.

**Fig 15:** The amount of concentrate feed offered in individual farm in regard to milk production**.**

**Fig 16:** Chemical composition (%DMB) of concentrate feed of different dairy farms.

**Fig 17:** DM values of concentrate feed rations of different dairy farms.

**Fig 18:** Moisture value of different dairy farms concentrate feed rations (% DMB)

**Fig 19:** The CP, CF, EE, NFE, TA and AIA values of different farms.

**EXPERIMENT: II**

The effect of feeding existing ration on the body weight gain of eight cattle of CVASU perspective categorized in three groups i.e. Group I, Group II and Group III respectively.

**Table 4.6: Nutritive value of existing concentrate ration (% DMB)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Moisture(%) | DM(%) | CP(%) | EE(%) | TA(%) | ME (kcal/kg) |
| 8.83 | 91.17 | 16.30 | 5.72 | 4.97 | 2367 |

The various feed ingredients used for formulating ration during feeding experiment were analyzed individually for their proximate composition. The value has been presented in Table: 2.The Metabolizable Energy (ME) content of the ration was 2367 kcal/kg, and CP, EE, TA content of the ration was 16.30, 5.72, 4.97 respectively (Table 4.6).

**Table 4.7: Microscopic examination of feces for parasitic egg/ Oocyst**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group | Saline wet mount | Iodine wet mount (cyst) | Floatation | Anthelmentics used |
| Group: I | **+ve** | **-ve** | **-ve** | Triclabendazol +Levamisole |
| Group: II | **+ve** | **+ve** | **-ve** | albendazole |
| Group: III | **+ve** | **+ve** | **-ve** | albendazole |

Group I animal Coproscopy examination found nematode egg mainly *Haemonchus sp.* and mixed infection with other nematodes causing parasitic gastroenteritis (PGE)*,* alongwith Paramphistomiasis. The animals are treated with combined preparation of triclabendazole and levamosole. According to Islam *et al*., (2005) levamisole and triclabendazole is effective against gastrointestinal nematodes and trematodes. In fecal nematode egg counts also reduced 96.10% while those treated with levamisole Talabi *et al*. (2002). Group II and III animals having small parasitic load with Paramphistomiasis and *Haemonchus sp.* They are treated with albendazole @10 mg / kg body weight. According to Theodorides, *et al.* (1976) albendazole is a broad spectrum [anthelmintic](http://en.wikipedia.org/wiki/Anthelmintic), effective against: [roundworms](http://en.wikipedia.org/wiki/Roundworm), [tapeworms](http://en.wikipedia.org/wiki/Tapeworm), and [flukes](http://en.wikipedia.org/wiki/Trematoda) of [domestic animals](http://en.wikipedia.org/wiki/Domesticated_animal) and [humans](http://en.wikipedia.org/wiki/Human). Junquera, (2013) stated that albendazole is effective against **gastrointestinal adults** and **L4-larvae** of the most important species in young animal. A low dose of *Eimeria* Oocyst is found in iodine wet mount (Group II and III) which is insignificant, as >5000 oocyst /g feces is significant (Radostits, *et al.*, 2000).

**Table 4.8: Examination of ruminal fluid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Traits | Group: I | Group: II | Group: III | Standard |
| Color | Greenish | Grey | Grey | Variable |
| Odor | Aromatic | Aromatic | Aromatic | Aromatic |
| Consistency | Viscous | Viscous | Viscous | Viscous |
| pH | 7.1 | 6.2 | 6.3 | 6.2-7.2 |
| Protozoal motility | ++++ | +++ | ++++ | Variable |
| protozoa per ml | 0.3$ x$ 105 | 0.2$ x$ 105 | 0.3$ x$ 105 | 105-106 |

Values are the average of group of animals

**Protozoal motility**

++++ = Very rapid movement, whole mass is moving.

 +++ = Rapid movement, very large population of protozoa showing their motility.

The color of ruminal fluid of randomly selected animal (two from each group) were found as greenish, grey and grey for Group I, Group II and III animals respectively. The odor of ruminal fluid was found aromatic in all groups of animals. The consistencies of ruminal fluid were found viscous in all groups. The pH of ruminal fluid for Group I, Group II and Group III animals were found as 7.1, 6.2, and 6.3 respectively. The quality of color, odor, consistency and pH are supported by Radostits, *et al.*, (2000).Theother experiment by Samanta *et al.*, (2005) showed that the cattle’s grazing on natural pasture the rumen pH was always highest above 7.0 irrespective of post feeding intervals. In the present investigation,Group I was highest pH. It might be due to higher secretion of alkalizing agents through saliva and fed on straw. The protozoal motility of Group I and III animals were found very rapid movement, whole mass is moving and incase of Group II was shown rapid movement with very large population of protozol motility. In quntitive protozoal cont the total protozoal population were found as 0.3$ x$ 105, 0.2$ x$ 105, 0.3$ x$ 105 respectively, for Group I, Group II and Group III animals. All values are shown within physiological limit as supported by Bergen, (2004).

**Table 4.9: Average body weight gain of experiment animal**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Group | Animal No. | Initial body weight | Body weight after 15 days | Body weight after 60 days | Average Body weight gain/day |
| Group: I | 1 | 200 | 212 | 247 | 0.78 |
| 2 | 130 | 137 | 185 | 0.91 |
| 3 | 150 | 166 | 198 | 0.80 |
| Group: II  | 4 | 107 | 117 | 156 | 0.82 |
| 5 | 60 | 75 | 108 | 0.80 |
| Group: III | 6 | 149 | 156 | 203 | 0.90 |
| 7 | 146 | 162 | 200 | 0.90 |
| 8 | 79 | 82 | 119 | 0.67 |

A randomized block design with multiple observations was conducted to test whether replication has significantly different effect for gaining body weight from three preparation of feed. A randomized block design with 3 randomly selected cows per plot was laid in 3 replications or block. The model can be written as:

$y\_{ijp}=μ+t\_{i}+b\_{j}+\left(tb\right)\_{ij}+e\_{ijp }; $ Where $y\_{ijp}$ are the observations on the pth sample for ith treatment in the jth block or replication. ($i=1,2,……..,k;j=1,2,……..,r and p=1,2,……..,s$). Table 4.10 represents the parameter estimates of randomized block design with multiple observations. The result demonstrated that replication or block (group1, group2, group3) had significantly different effect for gaining weight (Fcal=11.17, P-value <0.001).

**Table 4.10: Parameter estimates by using least square estimate method**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameters | Degrees of Freedom | Sum of Squares | Mean Sum of Squares | Fcal Value |
| Replication | 2 | 28217.56 | 14108.78 | 11.17 |
| Treatment | 2 | 10878 | 5439 |  |
| Replication\*Treatment | 4 | 127.77 | 31.94 |  |
| Sampling Error | 18 | 22736.67 | 1263.15 |  |

**Fig 20:** Average body weight gain of experiment animals group.

**Fig 21**: Average body weight gain of individual animal in each group.

From Fig 21. It is clear that the average body weight gain of three animals belonged to GroupI animals were 0.78, 0.91 and 0.80 respectively. The average weight gain was not uniform which may be due to variation in age and feed intake. The average body weight gain of two animals belonged to Group II were shown more or less uniformity in body weight gain. In case of Group III, two animals (animal no. 6 and 7) in total of three shown uniformity in average live weight gain but animal no.8 had the lower growth rate which may be due to less feed intake and cold shock. The result of live weight weight gain is closer to the findings of Nissanka *et al.,* (2010)but higher than the findings of Pandya *et al.,* (2009)