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EFFECT OF FEEDING INEDIBLE WHEAT FLOUR AND PASTA INDUSTRY WASTE IN COMBINATION WITH BROILER LITTER ON THE PERFORMANCE AND BLOOD SERUM PARAMETERS OF BUFFALO CALVES

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SUMMARY

Two experiments were conducted to investigate the possibility of utilizing either inedible wheat flour (IWF) or pasta industry waste(PW) in combinations with broiler litter(BL) as feed ingredients in rations for growing buffalo calves. In the first experiment (Expt.1),twelve male buffalo calves (8 mo old) were randomly assigned to four groups.In the second experiment (Expt.2) fourteen male calves (10 mo old) were assigned to three groups.The control ration,G1, in each experiment was composed of 60% concentrate feed mixture, (CFM) and 40% berseem hay,(BH). In both experiments, CFM was replaced by either IWF (Expt.1) or PW (Expt.2) plus BL at a ratio of 2:1, respectively, for G2. While ration of G3 was composed of 50% IWF (Expt.1) or PW (Expt.2) plus 25% BL and 25% BH. Calves of G4 in Expt.1 were fed 60% IWF, 30% BL and 10% BH.

Including either IWF plus BL or PW plus BL in buffalo ration had no effect (P>0.05) on daily gains, DM efficiency and the digestibilities of DM,OM and CP. Replacing CFM with PW plus BL had no effect on blood parameters, however a slight non significant decrease in the performance of buffalo calves was detected.The results indicated that IWF is better source of energy compared with PW. Replacing CFM protein with BL protein in buffalo calves rations did not affect protein utilization.

Keywords: Buffalo calves, inedible wheat flour, pasta industry waste, broiler litter, growth, blood parameters.

INTRODUCTION

The rapid increase in human population in Egypt necessitates a corresponding increase of animal products to provide adequate quantities of animal proteins. One of the main constrains facing animal production in Egypt is the shortage of feedstuffs. Efforts of scientists should, therefore, be directed towards exploring the possibility of using untraditional feed ingredients in the production of ruminants feeds.

Poultry wastes has been used successfully in ruminants rations as potential source of nitrogen (Fontenot and Webb,1974; Parthasarathy and Pradlhan, 1985 and El-Ashry *et al.,* 1994). Its production has been estimated of about 0.5 - 0.8 million metric ton (MMT) as dry matter annually,having crude protein of about 160,000 MMT which is really equivalent to or more than crude protein of the two main protein sources in the ration of the farm animals in Egypt (the cotton seed meal and linseed meal, A.E.S,1993).

Also, inedible wheat flour (IWF) and pasta industry (PW) waste are products that does not comply with the specifications for the flour grade intended for human consumption but have been found to be suitable as feed ingredients in livestock ration. In addition, pasta industry waste (PW) has been estimated at 4 - 6% of the total annual production of the pasta in Egypt. According to Higazy and Hawas (1992) the annual pasta production in Egypt is about 665,000 MMT. This means that the amount of PW is ranges from 26,000 to 40,000 MMT annually. Moreover, PW is a processed type (cooked) of wheat flour. Rooney and Gfelder (1986) reported that such processing (gelatinization) makes it more susceptible to enzyme attack and hence upgrades its digestibility.

Such wastes (IWF and PW) are excellent sources of energy for livestock if included at the proper level in the rations.

Suitable combinations between these wastes should support ruminant performance.

This study was, therefore, carried out to investigate the possibility of utilizing either IWF or PW as sources of energy incombination with uncommon nitrogen source, BL, as sources of feed ingredients in rations for growing buffalo calves.

MATERIALS AND METHODS

This study was carried out at the Experimental Farm of The Milk Replacer Research Center for Buffalo Calves, Faculty of Agricultural Ain Shams University.

Broiler litter, BL, (wheat straw bedding, from the intensive broiler production houses, El-Salam Company, Cairo) was used in this experiment as a nitrogen source in combinations with either inedible wheat flour, IWF, (not suitable for human consumption due to damage during storage) or pasta industry waste, PW, (both from North Cairo Company for Milling , El-Salam branch , Cairo) as a source of energy in a ratio of one part of BL : two parts of either IWF or PW , to replace traditional concentrate feed mixture (CFM) in growing buffalo calves rations through two experiments.

Concentrate feed mixture , CFM, consisted of 40% undecorticated cotton seed meal, 26% wheat bran, 20% ground maize (grains), 7% molasses, 4% rice bran, 2% limestone and 1% sodium chloride. The experimental animals were fed their allowances which were equal to 3% of their live weight, LW, on dry matter basis.

EXPT. 1

Twelve buffalo male calves (8 months old) were used in a 486 d feedlot growth performance trial to determine the effect of using combination of BL and IWF as ingredients in daily rations on the performance and nutrient digestibilites. Animals were randomly assigned to four experimental groups of 3 animals each, where the control group (G1, 172 kg LW) was fed 60% and 40% of their dry matter intake from

CFM and berseem hay (BH), respectively. In the second group (G2, 166 kg LW) the CFM was replaced by IWF and BL at a ratio of 2:1 (40% of IWF and 20% of BL) in addition to 40% BH, based on total DM intake. The third group (G3, 169 kg LW) was fed 50% IWF, 25% BL and 25% BH. While the fourth group (G4, 172 kg LW) was fed 60% IWF, 30% BL and 10% BH.

EXPT. 2

Fourteen male buffalo calves, 10 month old, were used in this trial through experimental period of 382 d, to study the effect of using PW and BL in daily rations on the performance,nutrient digestibilities and blood serum parameters of growing buffalo calves. Animals were randomly assigned to three experimental groups to receive one of the three experimental diets. The first group (G1, 6 heads, 206 kg LW) was fed the control diet, 60% CFM and 40% BH, DM basis. The second group (G2,4 heads,207 kg LW) was fed the same level of BH while CFM was replaced by 40% PW and 20% BL. The third group (G3,4 heads ,208 kg LW) received a ration composed of 25% BH plus 50% PW and 25% BL.

Chemical composition of the different ingredients and the composition of the experimental rations which were fed to the animals of the two experiments ,are shown in Table (1) and Table (2), respectively.

Table 1. Chemical composition of IWF, PW, BL, CFM and BH (% DM, basis).

Component	IWF	PW	BL	CFM	BH
Dry matter (DM)	91.0	90.7	91.1	89.3	90.8
Organic matter (OM)	98.9	91.8	85.1	89.2	87.6
Crude protein (CP)	9.0	11.2	22.0	14.1	14.1
Ether Extract (EE)	2.0	1.0	1.4	3.5	1.7
Crude fiber (CF)	1.3	0.0	23.8	13.7	27.7
Nitrogen free extract (NFE)	86.6	79.6	37.9	57.9	44.1
Crude Ash (Ash)	1.1	8.2	14.9	10.8	12.4

Table 2. Percentage of ingredients in the experimental rations of Expt. (1&2) and calculated chemical composition of the rations (DM, basis).

Items	Expt. 1				Expt. 2		
	G1	G2	G3	G4	G1	G2	G3
IWF	--	40	50	60	--	--	--
PW	--	--	--	--	--	40	50
BL	--	20	25	30	--	20	25
CFM	60	--	--	--	60	--	--
BH	40	40	25	10	40	40	25
DM	91.2	90.1	89.2	89.3	89.9	90.8	90.8
OM	89.4	91.9	92.9	93.8	88.6	88.8	89.1
CP	14.1	13.6	13.5	13.4	14.1	14.5	14.6
EE	02.8	01.8	01.8	01.8	02.8	01.4	01.3
CF	19.3	16.4	13.5	10.7	19.3	15.8	12.9
NFE	53.2	60.2	64.1	67.9	52.4	57.1	60.3
Ash	10.6	08.0	07.1	06.2	11.4	11.2	10.9

Experimental animals were individually fed in semi open separated sheds and allowed to drink fresh water three times daily.

Chopped BH and the concentrate portion of the ration were offered in two equal parts, twice daily (8.00 and 15.00 h).Fasting body weight was individually recorded twice a month and the daily ration was adjusted accordingly.

The nutrients digestibilities of the tested ration in both experiments (Expt. 1&2) were determined after two months of the beginning of each experiment by using the index substances method described by Van Soest (1980). Silica was used as an internal marker determined in the feed,residuals,iany,and faeces ,then the following formula was applied:

$$\text{Dig. \%} = 100 - 100 \frac{(\text{\% of Silica in Food})}{(\text{\% of Silica in Feces})} \times \frac{(\text{\% of Nutrient in Feces})}{(\text{\% of Nutrient in Food})}$$

Samples of feedstuffs, i.e, IWF, PW, BL, CFM and BH as well as faeces were subjected for DM, CP, CF, EE , ash and silica analysis according to A.O.A.C. (1984) while NFE values were calculated by difference.

Blood samples were collected from each animal of experiment 2 at monthly intervals up to the end of the experiment to determine total protein "TP", albumin "Alb", globulin "Glb", and total cholesterol "Chol" levels in blood serum. The blood samples were withdrawn two hours post morning feeding (10.00 h) from the jugular vein. Blood serum was then stored at -20°C till lab. analysis.

Total protein was determined according to Armstrong and Carr (1964). Serum albumin was determined according to Doumas *et al.* (1971). The concentration of Glb. was obtained by subtracting the albumin value from the TP concentration and A/G ratio was calculated. Determination of serum total cholesterol was carried out according to the method of Watson (1960).

Data of the present study were subjected to statistical analysis according to complete randomized design outlined by Steel and Torrie (1980) . Duncan's Multiple range test and least square means were applied using general linear model of SAS (1985) procedures .

RESULTS AND DISCUSSION

Experiment 1:

Average daily gain (ADG) of the animals for G2 was superior to that for the other groups (Table 3), although differences were not significant. Values of ADG values for the experimental groups were 494, 564, 514 and 512 g/d for G1, G2, G3 and G4, respectively, being higher by 14 , 4 and 3% for the groups fed the mixture of IWF and BL at different levels (G2, G3 and G4, respectively) when compared with the control group, G1.

Data presented in Table (3) revealed that there were no significant differences (P>0.05) among groups with respect to daily DM intake (DMI) or DM conversion (DMC) although values of DMC recorded for G2 (14.5 kg DM/kg gain) were better than those of the other groups (16.4, 16.3 and 16.6 kg DM/kg gain for G1, G3 and G4 respectively). There was no significant difference in DMI when expressed as g/kg LW. Differences of daily DMI is due to the feed residues,where the amount of daily DM offered were restricted (3% of LW).

Organic matter intake (OMI) values, (Table 3) increased progressively with increasing the percentage of IWF in the ration. This is due to the low ash content in IWF (Table 1) compared to that of CFM. Daily OMI by the calves of G3 and G4 groups were significantly higher ($P \leq 0.05$) than those recorded for G1 & G2 groups. At the same time, OMI g/kg LW values were significantly lower ($P \leq 0.05$) for G1 & G2 (24.7 & 24.8 g, respectively) than those for G3 (26.5 g) and G4 (26.9 g). On the other hand, no significant differences ($P > 0.05$) were observed among group means in organic matter conversion (OMC, kg OM /kg gain) although there was a remarkable improvement in the case of G2 when compared with the other groups.

Table 3. Nutrients intake and productive performance (SE) of buffalo calves fed the tested rations (Expt. 1).

Parameter	G1	G2	G3	G4
No. of Animals	3	3	3	3
Initial LW (kg)	172 ± 11	166 ± 18	169 ± 15	172 ± 14
Final LW (kg)	412±- 27	440 ± 17	419 ± 22	421 ± 18
Exper. period (d)	486	486	486	486
ADG (g/ d/ h)	494 ± 0.01	564 ± 0.01	514 ± 0.01	512 ± 0.01
DMI (kg/ d/ h)	8.1 ± 0.07	8.2 ± 0.08	8.4 ± 0.07	8.5 ± 0.07
DMI (g/ kg LW)	27.7	27.1	28.6	28.6
DMC (kg/ kg gain)	16.4 ± 1.66	14.5 ± 1.83	16.3 ± 1.66	16.6 ± 1.82
OMI (kg/ d/ h)	7.2±0.07 a	7.5±0.08 a	7.8±0.07 b	8.0±0.07 b
OMI (g/ kg LW)	24.7 a	24.8 a	26.5 b	26.9 c
OMC (kg/ kg gain)	14.6 ± 0.65	13.3 ± 0.72	15.2 ± 0.65	15.6 ± 0.65
SEI (kg/ d/ h)	3.4±0.05 a	4.3±0.05 b	4.5±0.05 c	4.7±0.05 d
SEI (g/ kg LW)	11.6 a	14.2 b	15.3 c	15.7 d
SEC (kg/ kg gain)	6.9±0.39 a	7.6±0.43 a	8.8±0.39 b	9.2±0.39 c
DPI (kg/ d/ h)	778±0.01 a	730±0.01 b	739±0.01 b	731±0.01 b
DPI (g/ kg LW)	2.66 a	2.41 b	2.51 b	2.46 b
DPC (kg/ kg gain)	1.57±0.10 b	1.29±0.11 a	1.43±0.10 b	1.74±0.10 b

a, b, c Means bearing unlike letters in the same row are significantly different ($P \leq 0.05$) SE for LS Mean.

Animals of G4 showed the highest ($P \leq 0.05$) daily starch equivalent intake (SEI) followed by G3, G2 and G1 groups. The differences were significant ($P \leq 0.05$) among all the groups. This was mainly due to the high level of soluble carbohydrate in IWF. Furthermore, values of starch equivalent conversion, SEC, exhibited the same trend. Although there are some limitations in using wheat in ruminant rations (Varner, 1971), the use of IWF gave similar results as those with the traditional ration (G1). Moreover, in some cases IWF rations were better utilized than the traditional one (Table, 4).

Data of calves of G2 was generally better than those of the other groups in utilizing DM, OM, and DP in terms of kg intake/kg LW gain. It seemed that the good status of protein utilization by this group (G2) and the moderate level of BL in the ration (20%) made it possible for the animals to digest starch better than those in the other groups (Table, 4) as well as utilize DM and OM better and finally achieve the best average daily gain among all groups (Table 3) although differences of ADG were not significant, (P>0.05). Shah *et al.* (1981) stated that beef cattle responded positively to BL up to 40% as a safe margin in ruminant ration.

Values for daily digestible protein intake (DPI) for the different experimental groups were 778, 730, 739 and 731 g/h/d for G1, G2, G3 and G4, respectively. Animals of the control group (G1) consumed significantly (P≤0.05) higher DPI. In addition, G2 was significantly (P≤ 0.05) better in utilizing DPI in terms of DPI/kg LW gain where animals of G2 consumed 1.29 kg DP to produce one kg LW gain as compared with G1 (1.57 kg), G3 (1.43 kg) and G4 (1.74 kg).

No significant differences were detected among the experimental groups (P>0.05) in the digestibility of DM ,OM and CP Table (4). Lower values (P≤ 0.05), however, for EE, NFE and CF digestibilities were recorded for the control ration.According to NFE digestibility, the very fine particle size of IWF might escape fermentation in the rumen and be digested better in the lower tract since the starch composes the most proportion of NFE is digested 42% more efficiently in the small intestine rather than in the rumen (Owen *et al* ,1986). For these reasons,mentioned above, calves fed IWF and BL gained slightly faster especially those of G2. Values of SE were affected by replacing CFM with IWF plus BL resulted an increase (P≤0.05) in the energy utilization.

Generally, values of ADG recorded in this study were in good agreement with those obtained by El-Hakim *et al.* (1971) and Bedier *et al* (1978) for growing calves.However, values of ADG reported here were lower than those (671 - 910 g/d) obtained by Hussein (1986) and Omar, *et al* (1993) for fattened buffalo calves. At the same time ,the present values were higher than those obtained by Helali *et al.* (1995, 350 - 410 g/d) for growing buffalo calves.

Table4. Nutrient digestibilities and nutritive values of the tested ration,g/kg, Expt.(1).

Nutrient	G1	G2	G3	G4
DM	692 ± 0.6	706 ± 0.6	710 ± 0.6	702 ± 0.6
OM	712 ± 0.6	732 ± 0.6	733 ± 0.6	701 ± 0.6
CP	681 ± 0.9	651 ± 0.9	653 ± 1.0	644 ± 0.9
CF	592 b± 1.9	645 ab± 1.9	681 a± 1.9	708 a± 1.8
EE	583 b±1.0	629 a± 1.0	632 a± 1.1	634 a± 1.0
NFE	559 b± 0.3	589 a± 0.3	586 a± 0.3	587 a± 0.3
SE	421 a	521 b	537 b	550 b
TDN	544	574	582	587
DP	96 a	89 b	88 b	86 b

[a,b] Means bearing unlike letters in the same row are significantly different (P≤ 0.05).

Experiment 2

There was no significant difference among the calves fed on the experimental rations on average daily gain (ADG,Table,5). Although,there was a remarkable difference among the control group(G1) and the other two groups which were fed on PW plus BL. The values of ADG were 618, 571 and 581 g/d for G1, G2 and G3 respectively.

The use of different rations had no effect ($P>0.05$) on DMI and OMI (Table 5). Themean values of DMI and OMI recorded for Expt.2 were somewhat higher than those of Expt.1. This may be due to the differences in the initial ages and weights.Values of DMI were 9.70 ,8.92 and 9.08 kg/day, for G1, G2 and G3,respectively. Differences of daily DMI is due to the feed residues,where the amount of daily DM offered were restricted(3% of LW). Dry matter intake values,however, were in agreement with those obtained by Mudgal (1985) for Murrah buffalo calves which ranged from 8.79 to 10.93 kg/day.

There was no effect ($P>0.05$) on DM and OM conversion when growing buffalo calves were fed the different experimental rations (Table 5).It may be due to the restriction of feed offered and/or the absence of the significancy in ADG values among experimental groups.

Data of Table 5 however, showed that no significant differences ($P>0.05$)were detected among the experimental groups in SEI. This may be due to the fact that animals of the control group, G1, consumed higher ($P>0.05$) DMI (9.7 kg/d)than those of the other groups, (Table 5). At the same time, rations of G2 and G3 had higher SE content than that of G1, which led to a similar daily energy intake. These results are in harmony with the assumption of Blaxter (1962) who reported that animals attempt to limit their level of energy intake according to energy content of the diet.

Significant difference ($P\leq0.05$) was observed in daily DP intakes among the experimental groups, where calves of G1 ate more DP (941 g/d) significantly, ($P\leq0.05$) than those of G2 & G3, (821 & 817 g/d respectively). This was mainly due to differences in DM intakes (Table 5) in addition to low protein digestibility (Table 6) noticed for G2 and G3 compared to that of G1. Differences in efficiency of utilizing DP were not significant ($P>0.05$) between different groups. Values od DPC were 1.52,1.44 and 1.41 kg DP/ kg gain for G1 ,G2 and G3, respectively.

Although, the daily gain of the calves fed the traditional ration (G1) was higher than those fed the tested ration (G2 & G3) no differences were detected among the experimental groups in feed efficiency when expressed either kg intake of DM or OM per kg LW gain. This was mainly due to the low intakes of DM and OM by calves of G2 and G3 compared with those of G1,which may balance the differences in ADG where the efficiency is a relation between the intakes and the gain.

The values in general were in agreement with the results obtained by Mudgal (1985) who generally concluded that feeding buffalo male calves high level of concentrate in ration is valid if compared to the traditional ration.

According to Ghoneim (1967) and Shehata (1976), the daily allowances of buffalo calves ranged from 4 to 5 kg SE which was achieved in the present experiment (Table 5).

In all digestibility coefficients values of the tested rations (Table 6), the control ration ranked the first followed by those of G2 and G3. The differences were not significant ($P>0.05$).These results are contrary to those obtained in Expt.1 where calves fed on the control ration had the lowest values of DM,OM,CF and NFE digestibilities. Differences of digestibility values may be due to the type of starch used (wheat bran starch for G1 vs cooked wheat flour starch for G3) as well as, the type of processing.

Cornett *et al.* (1971) found that digestibility of the energy components and crude protein decreased when wheat was steam flaked compared to rolling or micromizing processing.

Rations of G2 and G3 had higher energy content (SE)than those of (G1). This was mainly due to including PW in the tested rations (G2&G3) which resulted in increasing NFE and decreased CF content(see Table,1). Values of DP ranged between 90 to 97 g/kg, differences were not significant.

Non significant differences (P>0.05) were observed in all blood parameters tested for different treatments (Table 7). Values of total serum protein in the three experimental groups were slightly higher than those recorded by Fouad *et al.*, (1975).They reported that values of TP ranged from 6.7 - 9.3 g % for normal buffalo calves. This was probably due to the high levels of CP in the ration used in the present study (Table 2, 14.1 -14.6%). This is in accord with the conclusion of Kumar *et al.* (1980) who reported that there is a positive correlation between dietary protein and plasma protein concentration. In addition, high levels of serum protein reflect a good nutritional status of the animals as reported by O' Kelly (1973).

Table 5. Nutrients intake and productive performance (± SE) of buffalo calves fed the tested rations, Expt.(2).

Parameter	G1	G2	G3
No. of Animals	6	4	4
Initial LW (kg)	172 ± 13	201 ± 90	208 ± 11
Final LW (kg)	442 ± 21	419 ± 17	430 ± 18
Exper. period (d)	382	382	382
ADG (g/ d/ h)	618 ± 28	571 ± 33	581 ± 32
DMI (kg/ d/ h)	9.70 ± 0.2	8.92 ± 0.2	9.08 ± 0.2
DMI (g/ kg LW)	29.9	28.8	28.5
DMC (kg/ kg gain)	15.7	15.6	15.6
OMI (kg/ d/ h)	8.60 ± 0.2	7.92 ± 0.2	8.09 ± 0.2
OMI (g/ kg LW)	26.5	25.5	25.4
OMC (kg/ kg gain)	13.9	13.9	13.9
SEI (kg/ d/ h)	4.33 ± 0.1	4.32 ± 0.1	4.40 ± 0.1
SEI (g/ kg LW)	13.4	13.9	13.8
SEC (kg/ kg gain)	7.01 a	7.56 b	7.57 b
DPI (kg/ d/ h)	941 ± 25 a	821 ± 41 b	817 ± 31 b
DPI (g/ kg LW)	2.90	2.65	2.56
DPC (kg/ kg gain)	1.52	1.44	1.41

a,b Means bearing unlike letters in the same row are significantly differ (P≤0.05).

High levels of albumin in the blood serum (Table 7) of the animals fed G1, G2 and G3 (4.0, 4.0 and 3.7 g/100 ml serum, respectively) reflect no athological disorders in the liver. Values of the albumin are within the range obtained by Cornelius; (1970) being 3.5 to 5.0 g/100 ml serum for cattle. Values of globulin were 5.2, 5.1 and 5.5 g/100 ml serum for G1, G2 and G3, respectively. This came in agreement with the range reported by Fouad *et al.* (1975) on healthy buffaloes (1.5 : 6.0 g/100 ml serum). High levels of globulin may indicate good developed immunitic status. (Kitchennham *et al*, 1975).

Table 6. Digestibilities and nutritive values of the tested ration, g/kg, of Expt.(2).

Ration Parameter	G1	G2	G3
DM	732	727	653
OM	756	742	678
CP	691	651	617
CF	619	575	557
EE	610	562	558
NFE	602	587	579
SE	447 a	484 b	485 b
TDN	569	536	527
DP	97 a	92 b	90 b

The values of total cholesterol (Table 8) were 64.4, 54.8 and 52.9 mg/100 ml serum for animals fed G1, G2 and G3 rations, respectively. The values were in agreement with those obtained by O,Kelly (1973) who reported that the plan of nutrition had no significant influence on total serum cholesterol values.

Table 7. Effect of feeding the different experimental rations on serum protein constituents and serum total cholesterol of buffalo calves of Expt.2.

Ration Parameter	G1	G2	G3
Total Protein (g/ 100 ml)	9.1 ± 0.3	9.1 ± 0.3	9.2 ± 0.3
Albumin (g/ 100 ml)	4.0 ± 0.2	4.0 ± 0.2	3.7 ± 0.1
Globulin (g/ 100 ml)	5.2 ± 0.3	5.1 ± 0.3	5.5 ± 0.3
Serum A/ G ratio	0.8 ± 0.1	0.8 ± 0.1	0.7 ± 0.1
Total cholesterol(mg/100 ml)	64.4 ± 4.4	54.8 ± 5.0	52.9 ± 5.3

a,b Means bearing unlike letters in the same row are significantly different ($P \leq 0.05$).

Results from this study indicate that the use of either IWF or PW as sources of energy and dried BL as a source of nitrogen should be considered for use in the ruminant rations based on the levels used in this study. Moreover, data tended to suggest that 40% IWF and 20% dried BL (expt.1, G2) are the most suitable levels and can be successfully used to replace the traditional concentrate. Based on the present data, it is clear that IWF is better source of energy compared with PW in growing buffalo rations .However, replacement of CFM energy with PW showed a slight non significant decrease in the performance of buffalo calves. It is of interest to note that replacing the CFM protein with BL in buffalo calves ration did not affect protein utilization.

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تأثير استخدام دقيق القمح الغير صالح للغذاء ومخلفات تصنيع المكرونة مع فرشة الدجاج على الاداء الانتاجى للعجول الجاموسى النامية

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أجريت تجربتين فى هذه الدراسة بهدف دراسة تأثير التغذية على مصادر غير تقليدية للطاقة (دقيق القمح الغير صالح لغذاء الانسان أو مخلفات تصنيع المكرونة وللبروتين (فرشة دجاج اللحم) على الاداء الانتاجى ومعاملات هضم المركبات الغذائية وبعض صفات الدم فى عجول الجاموس النامية بغرض المساهمة فى حل مشكلة نقص الاعلاف فى مصر .

استخدم فى التجربة الاولى عدد ١٢ عجل ذكر (عمر ٨ شهور) وزعت عشوائيا علىاربعة مجاميع (مج ١، مج ٢، مج ٣ و مج ٤) وبكل مجموعة ٣ حيوانات بينما استخدم فى التجربة الثانية عدد ١٤ عجلا وزعت عشوائيا على ثلاث مجاميع (G3-G2-G1) بكل منها عدد ٦-٤-٤ عجلا على التوالى .

تغذت العجول التجريبية بمعدل ٣٪ من الوزن الحي كمادة جافة على العلائق طبقا لما يلي :-

المادة الغذائية	التجربة الاولى				التجربة الثانية		
المجموعة	١	٢	٣	٤	١	٢	٣
علف تقليدى	٦+	–	–	–	٦+	–	–
دريس برسيم	٤+	٤+	٢٥	١+	٤+	٤+	٢٥
دقيق القمح	–	٤+	٥+	٦+	–	–	–
مخلفات مكرونة	–	–	–	–	–	٤+	٥+
فرشة دجاج	–	٢+	٢٥	٣+	–	٢+	٢٥

أظهرت النتائج أن استخدام كل من دقيق القمح الغير صالح لغذاء الانسان أو مخلفات تصنيع المكرونة فى علائق الجاموس النامية ليس له تأثير معنوى على معدلات النمو والكفاءة الغذائية للمادة الجافة وكذلك على معاملات هضم المادة الجافة والعضوية والبروتين الخام ، على الرغم من أن العجول التى تغذت على +٤٪ (دقيق القمح الغير صالح لغذاء الانسان و +٢٪ فرشة دجاج اللحم اظهرت تحسن ملحوظا فى قيم الكفاءة الغذائية ومعاملات الهضم .

على الرغم من الانخفاض الغير معنوى اداء العجول المغذاة على دقيق القمح الغير صالح لغذاء الانسان و فرشة دجاج اللحم عند المستويات المختلفة لم تظهر اختلافات معنوية لبعض مكونات سير الدم (البروتين الكلى – الالبيومين – الجلوبيولين – الكولسترول) . كما اتضح أن دقيق القمح الغير صالح لغذاء الانسان يعتبر مصدر طاقة افضل من مخلفات تصنيع المكرونه فى علائق العجول الجاموسى النامية.