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PARTIAL REPLACEMENT OF CONCENTRATE FEED MIXTURE BY DRIED POULTRY LITTER AND YELLOW CORN IN THE DIETS OF GROWING BUFFALO CALVES

Abd-El Aziz, A.A.
Animal Production Research Ins.. Agric.Research Center, Giza, Egypt.

ABSTRACT

This study was carried out at a private farm at Ismailya Governorate to evaluate the effect of incorporation of dried poultry litter (DPL) at level of 25% of concentrate feed mixture (CFM) on growth performance of male buffalo calves, digestibility and some rumen liquor parameters. Ten male calves of an average initial live body weight (LBW) of 303.8 kg were used. The animals were divided into two equal groups, according to live body weight. Animals of the first group were fed on 2% and 1% of body weight CFM and wheat straw, respectively. The second group was fed similar to those of the first group but 50% of the CFM was replaced by 25% dried poultry litter and 25% yellow corn. In addition two metabolism trails were carried out with sheep to evaluate the feeding value of the experimental rations. Rumen liquor samples were collected from the sheep at the end of the metabolism trial to determine pH, NH_3 –N and TVFA·s at 0, 3 and 6 hrs of feeding. Daily dry matter intake (g/head) was non-significantly higher for the control diet than DPL diet (1268 *vs*. 1142 gm). Incorporating dried poultry litter lowered TDN and DCP intake (g/kg w $^{0.75}$). The digestibility coefficients of all nutrients of the DPL diet were, DM (63.01%), OM (65.76%), CP (55.60%), CF (49.76%), EE (85.80%) and NFE (73.93%). The corresponding values of control diet were, DM (64.67%), OM (65.20%), CP (59.01%), CF (41.36%), EE (84.04%) and NFE (73.75%). The digestibility of CF was improved by incorporating DPL and was significantly higher ($P<0.05$) for the tested diet compared with the control diet. The feeding values of the control and DPL diets as TDN were 60.20 and 60.50%, respectively. The nitrogen balance in both diets was positive and higher in the control diet (+6.52 vs. +6.12 gm/day). The nitrogen balance (NB) as % of N. intake or % of N digested was non-significantly higher for the DPL diet than the control diet. Incorporation of poultry litter at level of 25% CFM lowered daily gain of the buffalo calves than the control (0.704 vs. 0.778 kg. Animals fed the control diet consumed (9.357 kg/day) compared with (9.308 kg/day) for animals fed DPL diet. Feed conversion in the animals fed the control diet was better than the DPL group (12.267 vs. 13.400 kg/kg. gain), for TDN (7.384 vs. 8.105 kg) and DCP (0.836 vs. 0.848 kg). Including DPL in the diet increased slightly, pH of the rumen liquor than control diet, while NH_3-N concentration was increased significantly ($P<0.05$) at 0, 3 and 6 hrs. post feeding than the control diet. In both diets rumen NH_3-N concentrations reached the maximum at 3 hrs post-feeding. Total ruminal VFA`s were insignificantly higher for the DPL diet than the control diet. TVFA`s reached the maximum at 3 hrs post feeding for the two diets. The replacement of CFM by 25% DPL plus 25% corn had no negative effect on gain and health conditions of animals. The overall results showed that dry poultry litter and corn could efficiently replace 50% of concentrate (33% of the total ration) without adverse affects on digestibility and rumen liquid parameters by sheep. The replacement of part of conventional protein by dry poultry litter in male buffalo ration had no negative effects on , average dairy gains, health conditions or general appearance of animals and was economically better.

Keywords: Buffalo calves, growth performance, rumen parameters, feeding value.

INTRODUCTION

Poultry waste (dropping and litter) produced per year was estimated as 0.5-0.8 million metric tons, (Agriculture Economic and Statistics, A.E.S., 1993). This containing 160.000 metric tons crude protein which is higher than the major protein sources for the farm animals (El-Ashry, 1996). Muller, (1969) mentioned that beef cattle fed broiler litter up to 50% in their rations perform better without adverse effects. Therefore, the objective of this study was to investigate the effect of including poultry litter waste in the feed of male buffalo calves on their growth performance.

MATERIALS AND METHODS

The processing of poultry litter:

The poultry litter was collected from a commercial laying hens farm which contained 25-30% wheat straw as bedding material. The poultry litter waste was mixed well, then spread on the ground for sun drying.

Feeding trial:

Ten male buffalo calves with an average body weight of 303.8 kg. belonging to a private farm in Ismaillia Governorate were divided into two equal groups. The first group (control) was fed a basal ration consisting of CFM and wheat straw. The ingredients were offered at 2 % CFM and 1 % wheat straw, of their live body weight, respectively. . The second group was fed a tested ration as illustrated in Table (1),in which dried poultry litter (DPL) and crushed corn replaced equally half of the CFM of the control ration. The rations were offered twice daily at 8.00 a.m. and 3.00 p.m. in two equal portion and the water was available 3 times daily. The animals of each group were fed as group feeding on the rations during the experimental period. The animals were weighed biweekly for two successive days after 16 hrs of fasting and the experiment was extended for 87 days. The amounts of feed offered were changed according to changes in live body weight every two weeks.

Table 1: The experimental feeding rations (%on DM basis).

Experimental diet	Co-op feed mixture	Dried poultry litter	Crushed corn	Wheat straw
Rde Control	66.5	-	-	33.5
Dried poultry litter diet	33.5	16.5	16.5	33.5

Metabolism trail:

A digestibility and nitrogen balance trail was conducted at the end of the experiment. Two *in vivo* digestibility trails were carried out using six mature rams (three for each trail) and fed as same levels in the feeding trial, to evaluate the rations. Three rams were fed the control diet and another 3 rams were fed tested ration. The digestibility trail consisted of 21 days as a preliminary period and 7 days collection period. Feed offered and any refusals of feed were recorded daily. The feces and urine were measured.

Samples of feed offered, feces and urine analyzed according to A.O.A.C. (1990). Rumen liquor was taken using a stomach . rubber tube for concessive three days at 0, 3 and 6 hrs post feeding to estimate rumen pH, ammonia nitrogen, according to, (Conway 1963). The rest samples of rumen liquor were frozen at –20 ^{o}C till analysis, for total VFA`s according to (Abou-Akada and Osman, 1967). The data were analysed using the general linear models (Steel and Torrie, 1980), using SAS program (1990). Significant means were separated using the Duncan's multiple range test (1955).

Table 2: Chemical analysis of feed ingredients and calculated composition of the experimental rations (% on DM basis).

Item	OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture	88.05	14.95	10.49	4.08	58.53	11.95
Corn	98.41	9.40	2.46	4.26	82.29	1.59
Dried poultry litter	68.83	18.99	14.77	3.09	31.98	31.17
Wheat straw	86.70	4.70	38.00	1.40	42.60	13.30
Experimental ration (calculated)						
Control	87.59	11.51	19.71	3.18	53.19	12.41
Dried poultry litter	86.13	11.41	19.09	3.05	52.58	13.87

RESULTS AND DISCUSSION

During the digestibility trials, daily dry matter (DM) intake (Table 3) was higher for control (1268 gm) diet than dried poultry litter (DPL) diet (1142 gm), but the difference was not significant. However, daily DM intake/kg $w^{0.75}$ was non-significantly higher for DPL diet (Table 3). This result is agreement with those reported by (Kinzell *et al.,* 1983, Kishan *et al.,* 1984 and Abd El-Gawad *et al.,* 1989). The daily TDN intake /kg w $^{0.75}$ was non-significantly higher (50.56%) for the control diet than (43.0%) for the DPL diet (Table 3). Similarly DCP g/kg w $^{0.75}$ was higher (5.04) for the control diet compared with (4.51%) for the DPL diet (Table 3). The control diet showed better TDN and DCP intakes /kg $w^{0.75}$over diet containing poultry litter. Results illustrated in Table 3 showed that animals fed DPL diet had lower digestibility values of DM and CP than these fed the control diet. The results are in agreement with those of El-Ashry *et al.* (2000), but disagree with those reported by Smith *et al.* (1979). Although CP digestibility in the control diet (59.01%) was higher than DPL diet (55.60%), the differences was not significant (Table 3). The results of the present study are in agreement with Abd El-Gawad *et al.* (1989) who reported that sheep fed a control diet or 20 and 30% DPM diet did not differ in digestibility of crude protein (DCP). Digestibility coefficients for DM, EE and NFE were nearly similar for the control and DPL diet. The results in the present study agree with Kishan *et al.* (1984) who found that the digestibility of DM, OM and NFE were nearly similar with that of control in which 33% of concentrate mixture was replaced by poultry litter.

Table 3: Daily intakes, digestibility, feeding value and nitrogen balance of rations fed to sheep.

Item	Experimental rations		± SE
	Control (group A)	DPL (group B)	
Feed intake:			
Daily DM intake,(g/h/d)	1268	1142	99.24
Daily intake, (g/kg w $^{0.75}$/h/d)			
DM	69.53	71.0	
TDN	50.56	43.0	6.02
DCP	5.04	4.51	0.39
Digestibilities (%):			
DM	64.67	63.01	1.07
OM	65.20	65.76	1.07
CP	59.01	55.60	2.09
CF	41.36^{b}	49.76^{a}	1.74
EE	84.04	85.80	9.44
NFE	73.75	73.93	1.46
Nutritive value % :			
TDN	60.20	60.50	1.01
DCP	6.82	6.33	0.24
Nitrogen balance:			
N. intake, (NI),(g/h/d)	23.09	20.68	1.75
Total N. excretion, (g/h/d	16.52	14.56	1.02
N. balance,(NB)	+6.52	+6.12	+0.79
NB/NI (%)	28.40	29.20	1.53
NB/N digested (%)	49.70	50.90	3.39

a, b values with different superscripts in the same row differ significantly (P<0.05).

The digestibility coefficient of CF for animals fed the DPL diet was significantly (P<0.05) higher than those fed the control diet 49.76 and 41.36%, respectively. This result is in agreement with that obtained by Abd El-Gawad (1979) and El-Ashry *et al.,* (1987) and also with those reported by Abd El-Gawad *et al.* (1989) who found that replacing concentrate by about 20 and 30% of poultry manure increased the CF digestibility from 48.38 to 59.38 and 54%, respectively. Abd El-Gawad *et al.*(1989) also mentioned that incorporation DPL in the tested ration increased the CF digestibility. This may be due to that CF content of DPL was exposed to the enzymes and organisms in the digestive tract of the poultry, or increase availability of rumen degradable protein as indicated by higher rumen NH_3- N concentration (Table 4).

The feeding value of control diet expressed as TDN was 60.2% compared with 60.5% for DPL diet (Table 3). Similar trend was observed for DCP, being 6.82 vs. 6.33% for the control and DPL diets, respectively (Table 3). These findings are in agreement with those reported by El-Ashry *et al.* (2000).

Animals fed the control diet consumed non-significantly more nitrogen /day (23.09gm) than those fed DPL diet (20.68gm). However animals fed the control diet excreted non-significantly more nitrogen (16.52 gm) than excreted by those fed DPL diet (14.56gm). Therefore, the nitrogen balance for both

diets were positive in favor to the control diet (6.52gm) compared with (6.12gm) for the DPL diet (Table 3). The nitrogen balance as % of N intake or % of digested was non-significantly higher for the DPL diet 29.2 and 50.9%, respectively 28.4 and 49.7%, respectively for the control diet. These results agree with the findings reported by Khattab *et al.* (1982) and El-Ashry *et al.* (2000).

Rumen parameters:

Generally, rumen pH tended to decrease by the elapse of time after feeding in rams fed the control or poultry litter waste diet (Table 4). Ruminal pH was not significantly affected by treatment, but tended to be higher for the rams fed the ration containing dried poultry litter (Table 4). The ruminal pH values tended slightly to the acid side, specially after 3 hr post-feeding and with DPL group, this was due to the increase of total VFA's in rumen liquor (Abd El-Gawad *et al.,* 1989). These results are agree with those obtained by Harmon *et al.* (1974) who observed no-significant differences in ruminal fluid pH values between poultry litter ration and control ration. Also, are agreement with Caswel *et al.* (1977); Kwak *et al.* (1988) and Abd El-Mawala *et al.* (1996).

Table 4: Ruminal liquor parameters for sheep fed experimental rations.

Item	Sampling time (hrs)	Control	DPL diet
PH	0	6.46	6.71
	3	6.07	6.22
	6	6.02	6.15
NH_3-N (mg/100ml)	0	13.71^b	16.89^a
	3	14.57^b	25.43^a
	6	12.13^b	21.39^a
TVFA`s (mg/100ml)	0	4.16	4.66
	3	6.66	6.92
	6	5.60	5.95

a,b values with different superscripts in the same row differ significantly (P<0.05).

Rumen NH_3-N concentration was increased by incorporating DPL in the ration and was significantly higher (P<0.05) at 0, 3 and 6 hrs post feeding for the tested group than the NH_3-N control group (Table4). In both diets, rumen NH_3-N concentration reached the maximum at 3 hr post-feeding. It could be explained by the high non-protein nitrogen concentration in the dry poultry litter, increases ruminal NH_3-N concentration. The results agree with Kwak *et al.* (1988) and Soliman (1996). Similar trend was reported by Abd El-Gawuad (1979), Abd El-Gawuad *et al.* (1989) and Abd El-Aziz *et al.* (1993) who mentioned that ruminal NH_3-N concentration reached the lowest value before feeding, then increased to reach the maximum value at 3 hr post feeding.

Total ruminal VFA`S were insignificantly higher for the DPL diet than for the control diet during 0,3 and 6 hrs post-feeding. The maximum

concentration of TVFA's was observed at 3 hr and tended to decrease at 6 hr post-feeding for the two experimental groups (Table4). These results are agree with Abd El-Gawad (1989) but lower than their results with rations containing 0,10,20 and 30 % DPL.

Generally, the NH_3- N concentration were within the normal range for maximum rate of fermentation in the rumen with the DPL diet, while they were slightly lower than optimum with the control diet as reported by Mehrez (1992). This is supported by the more VFA·s with the DPL diet.

Growth performance:

During the growth performance trial of male buffalo calves**,** average daily gain of male buffalo calves fed dried poultry litter (DPL) diet was 0.704 kg compared with 0.778 kg for those fed the control diet (Table 5), however the difference was not significant. The results obtained indicate that incorporation of poultry litter reduced the average daily gain by 0.074 kg than the control. However, the differences were not significant (table 5). These findings are in accordance with those reported by Abd El-Mawla *et al.* (1996) who found that daily gain of buffalo calves was reduced by 9% when the poultry litter waste was incorporated in the ration by 16.3%. Similar trend was observed by Oliphant, (1974); Koenig *et al.* (1978); Dana *et al.* (1979) and El-Ashry *et al.* (2000).

Daily total dry matter intake (DMI) was 9.357 kg for the male buffalo calves fed the control diet while those fed the dried poultry litter (DPL) diet consumed 9.308 kg/day. The difference was not significant (Table 5). Concerning the metabolic body size ($w^{0.75}$) the daily dry matter intake was nearly similar in both groups being 117.6 and 119.6 g/day for the control and dried poultry litter waste diet, respectively (Table 5).This was mainly due to fixing amounts of feed in relation to body weight which was almost similar in both groups and no refusal were lift over. These results agree with Abd El-Gawad *et al.* (1989) and Abd El-Mawal *et al.* (1996). Buffalo bull calves fed poultry litter waste diet required more dry matter or TDN and DCP to produce 1 kg gain (13.4 vs. 12.267 kg DM/kg gain), (8.105 vs. 7.384 kg TDN/kg gain) and (0.848 vs. 0.836 kg gain). These results agree with Abd El-Mawla *et al.* (1996) who found that the overall averages feed/gain for the low (18.37%) and high (37.06%) litter group were lower being 86 and 81%, respectively, than of the control group.

Economic evaluation:

Tthe feed cost/kg gain in L.E was 6.526 and 5.523 for the control and dried poultry litter groups respectively (Table 5). Although the treated animals consume more feed, the cost of feed was less than the control group by 1.245 L.E. /h/d (Table 5).

Table 5: Growth performance, voluntary feed intake, feed efficiency and economic evaluation of experimental rations fed to buffalo calves.

Item	Experimental rations	
	Control (group A)	PDR (group B)
N. of animals	5	5
Duration period (day)	87	87
Initial L.B.W, kg	307.3	300.3
Final L.B.W, kg	375.0	361.6
Total gain, kg	67.70	61.3
Daily gain, kg	0.778	0.704
Daily feed intake, kg (on air basis):		
Concentrate feed mixture	6.823	6.619
Wheat straw	3.411	3.309
Total intake, (kg/h/d)	10.234	9.928
Total intake, kg/h/d (DM)	9.357	9.308
Daily intake, (g/kg w $^{0.75}$/h/d)		
DM	117.6	119.6
TDN	70.9	72.5
DCP	8.03	7.58
Feed conversion (kg/kg gain):		
DM	12.267	13.40
TDN	7.384	8.105
DCP	0.836	0.848
Economical evaluation :*		
Feed cost (LE) /kg feed	0.466	0.355
Total feed cost (LE) / kg gain	6.526	5.523
Total feed cost, LE /h/d	4.769	3.524

- **Calculation of feeds cost based on the following prices of feed ingredients: prices (L.E/kg) CFM 0.600 ; wheat straw 0.200 ; DPL 0.08 and yellow corn 0.450.**

CONCLUSION

The overall results showed that DPL and corn could efficiently replace 50 % of CFM (33 % of the total ration) without adverse effects on digestibilities and rumen function by sheep. The replacement of part of conventional protein by DPL in male buffalo diet had no negative effects on average daily gains, health conditions or general appearance of live animals and was more economically feasible.

REFERENCES

Abd El-Aziz, A. A.; M. E. Lashin; N. Oksh and R. T. Fouad (1993). Effect of some chemical treatment and feed additive on nutritional value of corn stalk. Blood and rumen parameters. J. Agric. Sci., Mansoura Univ., 18: 46.

Abd El-Gawad, A. M. (1979). Poultry manure and urea as protein supplements in sheep rations. M. Sc.Thesis Animal Prod. Dept., Fac. Agric., Cairo Univ.

Abd El-Gawad, A. M. (1989). Applied feeding of poultry manure as a feed ingredient for growing lambs. J. Agric. Mansoura Univ., 14: 1012.

Abd El-Gawad, A. M.; M. A. Hanafy; M. A. Shousha and O. A. I. Salem (1989). Digestibility and blood parameters for sheep fed rations

containing poultry manure. The 3rd Egypt. Brit. Conf on Anim, Fish and Poult. Prod 7-10 October, Alexandria, Egypt.

Abd El-Mawla. S. M.; M. A. El-Ashry. and J. P. Fontenot (1996). Effect of including sun cured broiler litter in buffalo calves rations on performance and nutrition utilization. International Symposium on buffalo Resources and Production Systems. 14-17 Oct. Anim. Prod. Res. Inst. Cairo, Egypt.

Abou-Akkada, A. R. and H. E. Osman (1967). Studies on the utilization of non-protein nitrogen in Egypt. J. Agric. Sci., 169: 25.

A.E.S. (1993). Agriculture Economic and Statistics. Economical Bull. (AEC). Egyptian Ministry of Agriculture, (In Arabic) pp. 478.

A.O.A. C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis 15th ed., Washington D.C., USA.

Caswell, L. F.; K. E. Webb and J. P. Fontenot (1977). Fermentation, nitrogen utilization, digestibility and palatability of broiler litter ensiled with high corn grain. J. Anim. Sci., 44: 803.

Conway, E. J. (1963). Micro diffusion Analysis and Volumetric Errors. 2nd Ed., Grosby-lookwood and Sons L. Td, London.

Dana,G. R.; J. P. Fontento; M. D. Hovatter; K. E. Jr. Webb and W. D. Lamm (1979). Livestock research report. Res Div. Report, 175. Virginia Polytechnic Institute and State Univ., Blacksburg, VA 24061. USA. Duncan, D.B. (1955). Multible Range and Multible F-test.Biometric, 11:1.

El-Ashry, M. A.; A. Z. El-Basiony; H. S. Soliman and H. M. El-Sayed (1996). 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. Egyptian J. Anim. Prod., (suppl. Issue) 33: 91.

El-Ashry, M. A.; H. M. Kattab; A. El-Serafy; H. Soliman and S. M. A. El-Moula (1987). Nutritive value of poultry waste for sheep. Biological Wastes, 19: 287.

El-Ashry. M. A; H. M. Khattab; M. K. Hathout and S. K. Sayed (2000). The use of different energy and nitrogen sources in complete rations for rahamany lambs. Proceedings of the conference on Animal Production in the 21st Century. Challenges and Prospects 18-20 April, Sahka, Kafr El-Sheikh, Egypt.

Harmon, B. W.; J. P. Fontenet and K. E. Jr. Webb. (1974). Effect of processing method of broiler litter ion nitrogen utilization by lambs. J. Aim. Sci., 39: 942.

Kattab, H. M.; M. A., El-Ashry; A. H. El-Serafy and H. S. Soliman (1982). Wood shaving duck litter in ration for growing lambs. Agric. Wastes, 4: 25.

Kinzell, J. H.; M. T.Yokoyama; L. R. Shull; J. D. Flegal Kerehbeil S. D.Sleight and J. R. Anstead l381.

Kishan, Jai, P. Lala and S. S. Engi (1984). Poultry litter based complete ration for sheep. India J. Anim. Sci., 54: 267.

Koeing, D. E.; E. E. Hatfield and J. W. Spears (1978). Animal performance and microbial adaptation of ruminants fed formaldehyde treated poultry waste. J. Anim. Sci., 46: 490.

Kwak, W.; J. P. Fontenot and J. H. Herbein (1988). Nutritive utilization from broiler litter processed by different method. Anim. Sci., Virginia Agric., Exp. Stat., 8: 54.

Mehrez,A.Z. (1992). Influence of roughage : concentrate ratio on N requerments of rumen microbes for maximal rate of fermentation. Proc. Int. Conf. On Manipulation of Rumen Microorganisms to Improve Efficiency of Fermentation and Ruminant Production, Alexandria, 20-23 Sept, 1992. PP.234 – 247.

Muller, Z. (1969). The influence of the substrate used as a base for deep litter upon the deep litter feeding value. Biol. Chem. VYz, Zvirat, 4: 133.

Oliphant, J. M. (1974). Feeding dried poultry waste for intensive beef production, Anim. Prod., 18: 211.

S.A.S (1990). SAS/STAT User's Guide (Version 6, 4th Ed.). SAS Inst. Inc., Cary, NC.

Smith, L. W.; C. C. Calvert and H. R. Cross. (1979). Dehydrated poultry excreta vs. cottonseed as a nitrogen supplements for Holstein steers. J. Anim. Sci., 48: 633.

Soliman, N. A. M. (1996). Nutritional quality of poultry litter as protein replacement in sheep ration. M. Sc. Fac. of Agric. Al-Azhar Univ.

Steel, R. D. and J. H. Torrie (1980). Principals and Procedures of Statistics: A Biometrical Approach 2nd Ed., McGraw Hill Book Company, New York.

الإستبدال الجزئي لمخلوط العلف المركز بفرشة الدواجن الجافة والأذرة الصفراء في علائق نمو العجول الجاموسي

عبد المرضي أحمد عبد العزيز

قسم بحوث استخدام المخلفات – معهد بحوث الانتاج الحيواني – مركز البحوث الزراعية

أجريت هذه الدراسة في مزرعة خاصة بمحافظة الاسماعيلية لدراسة تأثير محلفات زرق الدواجن الجافة بمستوى ٢٥% من العليقة المركزة على نمو ذكور العجول الجاموسى والهضم وبعض قياسات سائل الكرش . استخدم في هذه الدراسة عشرة عجول بمتوسط وزن ابتدائى ٣٠٣,٨ كجم ووزعت هذه الحيوانات علي مجموعتين متساويتيين طبقا لوزن الجسم. غذيت مجموعة الحيوانات بنسبة ٢% من مخلوط العلف المركز و١% تبن قمح كنسبة من وزن الجسم . وقد غذيت مجموعة الحيوانات الاولى علي العلف المركز بينما استبدل نصف العلف المركز (٥٠ %)بفرشة الدواجن والذرة الصفراء بنسبة متساوية (٢٥%فرشة و ٢٥%أذرة صفراء) . وفي نهاية التجربة أجريت تجربة هضم على الاغنام لتقدير القيمة الغذائية لهذه العلائق التجريبية وأخذت عينات من سائل الكرش عند صفر ، ٣ , ٦ ساعة من بداية التغذية وذلك في نهاية تجربة الهضم لتقديرالأس الهيدروجيني (pH) ونتروجين الأمونيا والأحماص الدهنية الكلية.

وكان متوسط المأكول اليومي للكباش (جم / رأس) غير معنوى لمجموعة المقارنة بالنسبة لمجموعة زرق الدواجن (١٢٦١ – ١١٤٢ جم) . وقد أدى ادخال زرق الدواجن في العليقة الي خفض محتواها من المجموع الكلى للمواد الغذائية المهضومة والبروتين المهضوم (جم / كجم وزن حى ^{٠,٧٥}) وكان معامل الهضم لعليقة فرشة الدواجن : مادة جافة ٦٣,٠١ % ، مادة عضوية ٦٥,٧٦ % ، بروتين خام ٦٠و٥٥ ، الياف خام ٤٩,٧٦ % ، دهن خام ٨٥,٨٠ % والمستخلص

الخالى من النيتروجين ٧٣,٩٣ % وكانت العليقة المقارنة : ٦٤,٦٧ % ، ٦٥,٢٠ % ، ٥٩,٠١ % ، ٤١,٣٦ % ، ٨٤,٠٤ % و ٧٣,٧٥ % بنفس الترتيب السابق . ولقد تحسن معامل هضم الأليـاف بادخـال زرق الدواجن فى العليقة بنسبة ٢٥ % ٤٠ وكان اعلى معنويا على مستوى ٥ % بالنسبة للعليقة المختبرة . وكان مجموع المواد الغذائية المهضومة لعليقة المقارنة وزرق الدواجن٦٠,٢٠ % و ٦٠,٥٠ % .كان ميزان النيتروجين بالنسبة للعليقتين موجبا وأعلى بالنسبة لعليقة المقارنة (+ ٦,٥٢ مقابل + ٦,١٢ جم / يوم) . ولم يكن ميزان النيتروجين كنسبة من النيتروجين المأكول او النيتروجين المهضوم معنويا بالنسبة للعليقتين . وقد أدى ادخال فرشة الدواجن بمستوى ٢٥ % من العلف المركز و ٢٥% أذرة صفراء الى خفض معدل النمو اليومى لذكور العجول الجاموسى مقارنة بعليقة المقارنة (٧٠٤, . مقابل ٧٧٨ , ٠ كجم) وأكلت الحيوانات المغذاه علي عليقة المقارنة ٩,٣٥٧كجم / يوم مقارنة بـ ٩,٣٠٨ كجم للحيوانات المغذاه على عليقة زرق الدواجن . وكانت الكفاءة التحويلية للحيوانات المغذاه على عليقة المقارنة أحسن من المغذاه علي عليقة فرشة الدواجن (١٢,٢٦٧ مقابل ١٣,٤٠٠كجم / كجم نمو) وكانت لمجموع المواد الغذائية المهضومة (٧,٣٨٤ مقابل ٨,١٠٥ كجم وكانت للبروتين المهضوم (٨٣٦, ٠ مقابل ٨٤٨, ٠كجم) . أدى ادخال فرشة الدواجن الجافة في العليقة الى زيادة بسيطة في تركيز أيون الايدروجين (Ph) فى سائل الكرش وزيادة تركيز الامونيا في سائل الكرش معنويا على مستوى (٥ %) بعد صفر , ٣ , ٦ ساعة من التغذية وذلك مقارنة بعليقة المقارنه . وقد زاد تركيز الأمونيا في سائل الكرش لكل من العليقتين الى أعلى نسبة له بعد ٣ ساعات من التغذية . وكان المجموع الكلى للأحماض الدهنية أعلي بدرجة غير معنوية لعليقة فرشة الدواجن مقارنة بعليقة المقارنه وقد وصلت الى أعلى تركيز لها بعد ٣ ساعات من التغذية لكلا العليقتيين. إستبدال مخلوط العلف المركز ب ٢٥% فرشة الدواجن الجافة و ٢٥% أذرة صفراء لم يكن له تأثير سلبي على النمو أو حالة الحيوان الصحية.

وقد أظهرت النتائج الكلية إمكانية إستبدال فرشة الدواجن الجافة والأذرة ب ٥٠ % من العلف المركز (٣٣% من العليقة الإجمالية) وذلك بدون تاثيرات مضادة على الهضم أوعلى قياسات سائل الكرش في الأغنام . إن إستبدال جزء من البروتين النباتي بفرشة الدواجن في علائق ذكور العجول الجاموسي لم يكن له تأثيرات سالبة على النمو اليومي والحالة الصحية أو المظهر العام للحيوانات وكذلك افضل إقتصاديا٠