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REPLACEMENT OF COTTON SEED CAKE WITH PALM KERNEL CAKE IN GROWING NILI-RAVI BUFFALO MALE CALVES

M. A. Tipu, F. Ahmad, A. Khalique*, M.N. Haque*, R.H. Mirza and U. Tayyab

Buffalo Research Institute, Pattoki District Kasur.
* University of Veterinary & Animal Sciences, Lahore
Corresponding author email address: murtaza _76@yahoo.com

The study was planned to see the effect of palm kernel cake on growth rate, feed intake and digestibility in buffalo calves at Buffalo Research Institute Pattoki District Kasur. 25 male calves (18 months age) having body weight of 160 $\pm$ 10 kg were divided in to 5 groups under Completely Randomized Design. Five iso-caloric and iso-nitrogenous concentrates viz A, B, C, D & E were formulated replacing 0, 25, 50, 75 and 100 % of cotton seed cake with 100, 75, 50, 25 and 0% palm kernel cake (PKC). Dry matter intake for group A (PKC 30%, CSC 0%) was 6.03kg, for B (PKC22.5%, CSC7.5%) was 5.75kg, for C (PKC 15%, CSC15%) was 5.92kg, for group D (PKC7.5% CSC 22.5%) was 6.25kg and for group E (PKC0%, CSC30%) was 6.24kg. Dry matter intake of group A and C was not significantly different ($P>0.05$) to each other (6.03 and 5.92kg/day) similarly DM intake of groups D & E was also non significant ($P>0.05$) to each other (6.25 and 6.24kg/day). But the DMI of group B was significantly lower ($P<0.05$) to all other groups. (5.75kg/day). Daily weight gain was higher in group A and D (0.85kg) followed by group C and E (0.82kg). Daily weight gain of group B was significantly lower as 0.75kg/day ($P<0.05$). Growth performance of all groups was non significant to one another ($P>0.05$) except group B. The feed conversion ratio (feed intake per unit gain) in group A was less (7.14) followed by group C, D, E and B respectively. The feed conversion ratio of group A was significant lower ($P<0.05$). Digestible DM, CP and NDF intakes were lower in buffalo calves fed diet A. It was concluded that Palm Kernel Cake can replace cotton seed cake without any harmful effect on growth performance in male buffalo calves.

Keywords: Palm kernel cake, Buffalo calves, Digestibility.

INTRODUCTION

In developing countries like Pakistan, there is shortage of conventional feed resources for livestock and there is a competition for available land for growing food crops and fodder. This adversely affects the production and reproduction efficiency of animals. Also the prices of ingredients used in compound feed are very high and livestock raising becomes uneconomical.

Traditionally, the farmers have been using cottonseed cakes for feeding to their livestock as a source of vegetable protein and its prolonged use can affect the fertility of animals (Zahid *et al*., 2003). Moreover, due to its limited supply, the cost of cottonseed cakes has gone high. Adulterations in cakes with other inferior ingredients and contamination with pesticides are other major problems. Feeds and rations are important factors affecting milk yield and performance of dairy cows and constitutes about 70 percent of the total cost of enterprises. Therefore, it is important to minimize the cost of feed by including cheaper protein sources without affecting the productivity of animal. There is a need for replacing cottonseed cake with some other vegetable protein source like palm oil cake which is a rich source of crude protein, has better nutritional profile and low cost as compared to cottonseed cakes. Palm Kernel Cake is the solid residue left after extraction of the oil from the oil palm kernel. PKC has been used in Malaysia as the only source of protein and energy in rations. Its protein contents ranges 16-20%. Palm Kernel cake is being imported in our country and is being used in livestock and poultry feed industry. Many attempts have been made to study the effects of different inclusion levels of PKC on performance characteristics of Poultry (Onwudike, 1998). But work of PKC in Livestock feeding especially in buffalo feeding has been limited. On the other hand it is high in crude fiber, (16-23%) is necessary to consider to used as a Livestock feed ingredients because ruminants can digest fiber effectively as compare to poultry (Siregar *et al*., 2003). As constant supply throughout the year and at relatively lower price, it can be a good source of protein in the ration of dairy and meat animals. The present study is designed to determine the efficiency of palm kernel cake compared with cotton seed cake for, fattening potential of Nili Ravi buffalo calves.

MATERIALS AND METHODS

The present study was carried out to study the effect of palm kernel cake on fattening potential in growing male buffalo calves. Twenty five male buffalo calves of 12 -15 month of age were selected from the herd maintained at LES, Bhunikey, Pattoki and were divided into five groups according to CRD design. Five rations were formulated in such away that 0, 25, 50, 75 and 100% cotton seed cake replaced with100, 75, 50, 25 and 0% palm kernel cake (Table-1). All five rations viz. A, B, C, D and E were iso nitrogenous and iso caloric. Each ration was allotted to each group of animals randomly. Animals were separately in a shed and stall feeding of TMR will be carried out. A probation period of two week was given to make the animals habitual to new feeding regime. Vaccination and deworming schedule was ensured. A weighed quantity of TMR was offered daily in the morning and left over was recorded next morning. Animals were weighed at fortnightly basis. Growth rate and feed consumed was computed on data record basis. Fresh and clean water was provided round the clock. The study was continued for three months.

Digestibility Study: During last week of each study, a digestibility trail was conducted. Fecal grab samples were taken twice daily such that a sample was obtained for every 3 hour interval of 24 hours period (Sarwar *et al*., 1991). The acid insoluble ash was used as digestibility marker (Van Keulen and Young, 1977).

Sample Collection and chemical analysis: The samples of experimental diets, orts and feces was dried at 55^0 C in a forced air oven and ground to 2mm particle size through a Wiley mill. These samples was analyzed for DM, N content and ash by the methods of AOAC (1990), neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) by the methods described by Van Soest *et al*. (1991).

Statistical Analysis: The data obtained for each parameter (The dry matter intake, digestibility, weight gain and feed efficiency) were analyzed according to Complete Randomized Design. The statistical model used for all parameters was;

$Y_{ij} = \mu + \tau i + \varepsilon_{ij.}$

Where, μ was overall mean,

τ_j was the effect of treatments (5 treatments) and

ε_{ij} was difference within treatment means (error term).

In case of significant ($p<0.05$) difference among treatment means, the Duncan's Multiple Range test was applied (Steel *et al*, 1997).

RESULTS AND DISCUSSION

Dry Matter Intake: Dry matter intake of groups A and C was not significant ($P>0.05$) to each other (6.03 and 5.92kg/day) similarly DM intake of groups D & E was also non significant ($P>0.05$) to each other (6.25 and 6.24kg/day). But the DMI of group B was significant lower ($P<0.05$) to all other groups, (5.75kg/day). The study did not show same results as in the case of Loh *et al*., (2002). In that study which was carried out on rats, maximum feed intake was in died contained 25% PKC. In our study maximum dry mater intake was in died contained 7.5% PKC and 0% PKC. This is due to difference in the physiology and anatomy of rats and ruminants. Our study is in agreement with Abouheif *et al*, (1999). In that research dry intake was decreased with increase in the level of PKC.

Growth Performance: The growth performance was not different in different groups ($P>0.05$) except group B. The daily weight gain of groups A, C, D and E was 0.85, 0.82,0.85,0.82kg/day. The daily weight gain of group B was significantly lower ($P<0.05$) which was 0.75kg/day.

The study is in agreement with Rahman *et al*, (2012) and Zahari and Alimon, (2003). According to Zahari and Alimon (2003), 30% PKC is a source of protein and energy in feedlot cattle. The inclusion level of PKC in sheep diet is 30%. In our study the animals consuming 22.5% PKC had significant ($P< 0.05$) lower daily weight gain but animals consuming30% PKC had not reduced weight gain. This might be some other unknown factors.

Feed Conversion Ratio: The Feed Conversion Ratio (feed intake per unit gain) in animals fed ration A was (7.14) which was less followed by group C, D, E and B respectively (7.22, 7.340, 7.60 and 7.64).The feed conversion ratio of group A was significant lower ($P<0.05$).In this group, 30% palm kernel cake was used and the inclusion level of cotton seed cake was zero. This study is in agreement with Rahman *et al*(2012) in which better FCR was noted in ration containing 32% palm kernel cake in goat .In our results better FCR was noted in animals fed diet containing 30% PKC.The study also coincides with Chong, C.H., *et al* (2008) in which excellent results were taken in the laying hens consuming upto 25% palm kernel cake.

Digestibility: Dry matter, crude protein and NDF digestibilities were lower ($p<0.05$) in buffalo calves fed A diet than those fed other diet (Table. 3). The reason behind low digestibility diet A was due to increased amount of NDF in feed. Our study is supported by Islam *et al* (2000) and Barbosa *et al*.(2010). According to them lower digestibility was observed due to high level of NDF in the rations. The other explanation is supported by Sundu and Dingle (2003).They had earlier reported that during processing, PKC may also undergo Maillard reaction (the reaction of mannose with amino groups leading to the formation of a brown complex) due to heat applied in the process before and during oil extraction and this may adversely affect the digestibility The digestibility was lower in diet A in which maximum inclusion level of PKC (30%) was used.

Table – 1. Ingredients and Chemical Composition (%) of Experimental Rations.

	Experimental Diets				
Ingredients	**A**	**B**	**C**	**D**	**E**
Maize Broken	11	11	11	11	11
Wheat straw	20	20	20	20	20
Wheat Bran	10	10	10	10	10
Cotton seed cake	0	7.5	15	22.5	30
Palm kernel cake	30	22.5	15	7.5	0
Maize gluten Meal 30%	10	10	10	10	10
Sunflower meal	3	3	3	3	3
Canola meal	2	2	2	2	2
Cane Molasses	12	12	12	12	12
Common salt	1	1	1	1	1
DCP	1	1	1	1	1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
DM%	88.28	88.29	88.29	88.29	88.29
CP%	14.13	14.26	14.41	14.41	14.40
ME M.cal/kg	2.55	2.55	2.55	2.55	2.55
NDF%	45.50	44.29	43.00	42.25	40.38
ADF%	19.20	18.60	18.15	17.60	17.08
ADL%	3.28	4.23	4.90	5.50	6.23
Cellulose %	11.11	11.89	12.50	13.20	13.88
HC%	20.90	21.30	22.00	22.55	23.21
Ash%	9.20	9.05	8.91	8.70	8.58

Table – 2. Chemical Composition (%) Of Cotton Seed Cake and Palm Kernel Cake

Parameters	**Cotton Seed Cake**	**Palm Kernel Cake**
Dry Matter %	90.00	90.00
Protein %	19.74	19.40
Ether Extract %	9.03	12.17
Crude Fiber %	20.31	16.06
Ash %	10.00	6.00
Nitrogen Free Extract %	30.92	36.37

Table – 3. Nutrient Digestion by Buffalo Calves Fed Experimental Diets.

Nutrient Digestibilities,%	**A**	**B**	**C**	**D**	**E**
Dry matter	60.10	61.20	63.45	63.80	64.50
Crude Protein	64.60	65.90	67.00	68.75	71.20
Neutral detergent fiber	34.00	35.40	36.20	38.10	39.50

Table – 4. Growth (kg) In Buffalo Calves Fed Experimental Diets

Parameters	A	B	C	D	E
Weight gain (kg)	77.05	67.6	74.2	76.9	73.8
Dry matter intake (kg)	6.03[b]	5.75[c]	5.92[b]	6.25[a]	6.24[a]
Daily weight gain (kg)	0.85[a]	0.75[b]	0.82[a]	0.85[a]	0.82[a]
Feed conversion ratio	7.14[b]	7.64[a]	7.22[b]	7.34[b]	7.60[a]

Means within row bearing different superscripts differ significantly ($p<0.05$)

REFERENCES

A.O.A.C. (1990). Official Methods of Analysis. 17th edition, Association of Analytical chemists, Arlingtion., Virginia, USA.

Abouheif, M.A., M.S. Kraidees and B.A. Al- Selbood (1999). The utilization of rumen content – barley meal in diets of growing lambs. Asian – Aust. J. Anim. Sci. 12: 1234-1240.

Barbosa, N. G. S., N.M. Rodriguez, P.C.C. Fernandes, A. R. G. Garcia, B. S. Nahum, E. S. Saliba, and I. Borges. (2010). Intake and digestibility of river buffalo steers (bubalus bubalis) fed different levels of palm kernel cake: effect of diet neutral detergent fiber, digestible energy, crude protein and extract ether. Vet. J. 21: 1668- 4834.

Chong,C.H., I. Zulkifli and R. Blair (2008).Effects of Dietary inclusion of palm kernel cake and palm oil, and enzyme supplementation on performance of laying hens. Asian-Aust. J. Anim. Sci, 21, 7:1053-1058.

Islam, M., I. Dahlan, M.A. Rajion and Z.A. Jelan (2000). Productivity and nutritive value of different fraction of oil palm frond. Asian- Aust. J. Anim. Sci.13: 1113-1120.

Loh, T.C., H.L. Foo, B.K. Tan and Z.A. Jelan (2002). Effects of Palm Kernel Cake on Performance and Blood Lipids in Rats. Aust. J. Anim. Sci. 15 (18): 1165 – 1169.

Onwudike, O.C. (1998). Used of palm kernel meal by laying birds Anim Feed Sci. Technol. 20: 279-286.

Rahman, Mohammad. Mijanur., Ramli Bin Abdullah, Wan Khadijah Wan Embong, Toshinori Nakagawa and Ryo

Akashi (2012). Effect of palm kernel cake as protein source in concentrate diet on intake, digestibility and live weight gain of goats fed Napier grass. Tropical Animal Health and Production. Volume 45, issue 3: 873- 878

Sarwar, M and S.A. L. Firkins and M. Estridge (1991). Effect of replacing NDF of forage with soy hulls and corn gluten feed for dairy heifers. J. Dairy Sci.74: 1006.

Siregar, Z., Supriadi, dan E. Mirwandhono (2003). Quality improvement palm kernel cake oil – cake through fermentation by Rhizopus and Nopcozime Supplementation to broiler. Faculty of Agriculture, University of North Sumatra. Medan.

Steel, R.G.D., J.H. Torrie and D.A. Dickey (1997). Principle and procedures of statistics. A biometrical approach. 3rd edition. Mc Graw Hill Book Co. Inc. New York. USA.

Sundu, B. Dingle J. (2003).Use of enzymes to improve the nutritional value of palm kernel meal and copra meal. Proceed. Queensland poultry Sci. Symposium Australia.1(14):1-15.

Van Keulen, J. and B. A. Young. (1977). Evaluation of acid insoluble ash as a natural marker in ruminant digestibility studies, J. Anim. Sci., 44; 282.

Van Soet, P.J., H.B. Robertson and B. A. Lewis. (1991). Methods of dietary fiber, NDF and non–starch.

Zahari, M. W. and A. R.. Alimon (2003). Use of palm kernel cake and oil palm by – products in compound feed. Palm oil developments 40.

Zahid, I. A., L.A. Lodhi, N. Ahmad, N. U. Rehman and M. Su. Akhtar (2003). Effect of cottonseed cakes (Gossypol) on live weight of teddy male goats. Pakistan Vet. J, 23: 27-30.