

THE USE OF CANOLA MEAL IN CONCENTRATE FEED MIXTURES FOR FATTENING BUFFALO CALVES

O. M. Abdel-Salam and T. A. Deraz

Animal production research institute, Agricultural Research Center, Ministry of Agriculture, Dokki, Giza, Egypt.

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SUMMARY

Three groups, each of 5 growing male buffalo calves with average initial body weight 274.46 Kg. were used in feeding trials to study the effect of using of canola meal as a source of protein in concentrate feed mixture (CFM), on buffalo calves performance, and some rumen and blood parameters. Three isonitrogenous CFM with 0, 15, 30% of canola meal, were offered to groups as 2.5% of body weight. Rice straw was used ad lib for all groups. Three digestion trials were carried out to determine the feeding value of the experimental rations. Results indicated that most of nutrient digestibility coefficients and feeding values TDN and DCP were not affected by increase canola meal in CFM. While CF digestibility coefficient decreased and EE increased with the increase of canola meal. Increased canola meal in CFM had no effect on blood serum parameters except AST value, body weight changes, feed intake and feed conversion, while caused decrease in cost of Kg gain.

Under the circumstances of this study, it can be concluded that the use of canola meal in CFM had no bad effect on buffalo calves performance, reduced cost of gain production and improved economic efficiency.

Keywords: *buffalo calves, canola meal, digestibility, body gain*

INTRODUCTION

In Egypt, cotton seed meal considers the main source of protein in animal nutrition. The annual production from cotton seed meal is about 136 thousand tons (FAO, 2003). The limited amount of cotton seed meal lead to search about another cheap source of protein to use it in animal feeds. In the last few years canola planted successfully in Egypt as a winter oil plant to extract oil for human consumption. The stretching for cultivates area of canola in Egypt produce a large amount of canola meal as a by- products of oil extraction. Canola meal (CM) contains more than 30% total protein (Fouad et. al., 2003). It is an excellent source protein for dairy cattle, beef cattle and lambs (Agbossamey et. al., 1977, Abdel-Salam and Mousa, 2003

and Abou- Hussein et. al., 2003). The aim of this study was to investigate the effect of including different levels of canola meal in the concentrate feed mixtures for buffalo calves on digestibility, nutritive value, some blood parameters, growth performance and economical efficiency.

MATERIALS AND METHODS

This study was conducted at Kanater Research station, Horticulture services unit, Agriculture Research center, Ministry of Agriculture.

Animals:

Fifteen buffalo calves of an average initial live body weight (274.5 Kg) were used in this experiment. Calves were blocked by weight in three similar groups (5 in each). Each group of calves was

assigned at random to receive one of the three experimental rations.

Rations and feeding:

The animals in group one were fed the experimental concentrate feed mixture (CFM 1) which have no canola meal, while animals in group two were fed (CFM 2) which contained 15% canola meal while animals in group three were fed (CFM 3) which contained 30% canola meal. The CFM's were formulated to be isonitrogenous. Experimental concentrate feed mixtures were fed at a rate of 2.5% of body weight with *ad lib.* amounts of rice straw. Feed ingredients of the three experimental CFM are presented in Table (1). Rations were offered individually in two portions daily at 8 a.m. and 4 p.m., while fresh water was freely available to animals.

The feeding trial lasted for 155 days. Live body weight changes and feed intakes were recorded at weekly intervals. At the middle of the feeding experiment, three calves were chosen at random from each group to determine the feeding values of the experimental rations. Acid Insoluble Ash (AIA) method was used as described by Van Keulen and Young (1977). Feeds and feces were collected during seven days. At the last day of the collection period blood samples were collected from the Jugular vein before feeding. Blood serum was separated by centrifugation at 4000 r.p.m for 15 minutes and kept frozen for later analysis.

Chemical analysis:

Feeds and feces were analyzed according to A.O.A.C. (1990). The chemical composition of experimental CFM's, and rice straw and calculated composition of consumed diets are presented in Table (2). Blood serum total proteins, albumin, and amino transferase (AST and ALT) were determined by the method of Peters (1968), Drupt (1974), and Reitman and Franklin, (1957),

respectively. Globulin was obtained by subtracting the albumin value from total proteins value.

Statistical analysis:

The data were statistically analyzed using GLM procedures of SAS (1992).

RESULTS AND DISCUSSION

Chemical analysis:

Chemical analysis of experimental CFM's are shown in table2. Data indicated that EE content slightly was increase with the increase of canola meal percentage; it might be a result of high EE content in canola meal (10.11). While CF and NFE content slightly decreased. The same trend was shown with rations. (EE increase and CF and NFE decrease with the increase of canola meal). These results are in accordance with those obtained by Fouad *et al.* (2003).

Table (2) also shown the analysis of rice straw, which are within the normal published range (Abou El- Naser and El-Kerdawy 2003, Gaber and Ahmed 2003, Shakweer 2003 and Yacout *et al* 2003).

Digestibility coefficient and nutritive values:

The results in table 3 showed the digestion coefficient of experimental rations. It can be noticed that no significant differences between the experimental rations for dry matter, organic matter, CP and NFE. However crude fiber digestibility was significantly higher for ration 1 (free from canola meal), followed by ration 2 which have 15 % canola meal, then ration 3, which contained 30 % canola meal. Also EE digestibility has a significant difference. Data indicated that the digestibility coefficient of EE increased with the increase of canola meal (being 76.92, 74.75 and 72.24 % for ration 3, 2 and 1 respectively). The higher apparent EE digestibility is mainly due to the increase of crude fat consumption (Table 2).

Table (1) : Different ingredients (%) of the experimental concentrate feed mixtures (CFMS)

Ingredient	CFM 1	CFM 2	CFM 3
Corn grains	37	35	30
Canola meal	0	15	30
Cotton seed meal	26	18	5
Linseed meal	26	15	5
Wheat bran	5	9	20
Molasses	3	5	7
Lime stone	2	2	2
Salt	1	1	1
Total	100	100	100

Table (2) : Chemical analysis of ingredients and calculated rations

Items	DM	OM	CP	CF	EE	Ash	NFE
CFM 1	88.12	92.63	18.18	10.11	2.50	7.37	61.84
CFM 2	88.41	92.51	18.28	10.05	3.65	7.49	60.53
CFM 3	88.32	92.28	18.21	9.62	4.89	7.72	59.56
Rice straw	87.19	84.89	4.08	33.11	1.32	15.11	46.32
Canola meal	89.11	94.22	32.41	16.74	10.11	5.78	34.96
Calculated							
Ration 1	87.94	89.49	12.46	19.44	2.03	10.51	55.56
Ration 2	87.92	89.47	12.61	19.25	2.72	10.53	54.89
Ration 3	87.91	89.54	12.98	18.32	3.57	10.46	54.67

Table (3) : Digestibility coefficient of the different nutrients and feeding value of experimental rations

Items	Digestibilities %					Feeding value %		
	DM	OM	CP	CF	EE	NFE	TDN	DCP
G1	69.73 ^a	71.59 ^a	66.63 ^a	54.41 ^a	72.24 ^b	78.67 ^a	65.58 ^a	8.30 ^a
G2	69.45 ^a	70.30 ^a	66.99 ^a	51.12 ^{ab}	74.75 ^{ab}	77.56 ^a	65.28 ^a	8.52 ^a
G3	69.29 ^a	69.67 ^a	67.37 ^a	49.27 ^b	76.92 ^a	76.58 ^a	65.25 ^a	8.66 ^a

a, b, and c means in the same column with different letters are significant (P < 0.05)

These results are in agreement with that Fouad *et al.*, (2003) and Abdel- Salam and Mousa (2003). On the other hand, decreased CF digestibility with increased levels of canola meal of ration may be associated with increased levels of fat results of the reduced activities of fiber degrading enzymes in ruminal digesta (Murphy *et al.*, 1987, Tasfa, 1993 and Fouad *et al.*, 2003).

Data in table 3 showed also the nutrition values (appreciative as TDN% and DCP%). The nutritive value expressed as DCP tended to shows slight increase as canola percent increased in rations. This could be explained by the slight high CP digestibility values, this has resulted in increased in the activity of proteolytic enzymes (Banerjee, 1988). Data in Table (3) indicated no significant differences between the three experimental rations in nutritive values.

Serum parameters:

Serum total protein and its fractions are considered index reflecting health and performance of animal (O'Kelly, 1973). Blood serum parameters as affected by feeding buffalo calves on canola meal diets are shown in Table (4). Data indicated that there were no significant effect in blood serum parameters except for aspartate transfers (AST) it increase with the increase of canola meal level in cfm data reveal that all serum parameters within the normal range. William (1997) reported that the normal level of total protein and albumin in blood of domestic animals has ranged between 6 to 8 and 3.5 to 4 gm / 100 ml respectively. On the other hand all values of AST are within the normal range found by Ahmed (1997) and Baraghit *et al.*, (2003) with native buffalo calves.

Animal performance:

Data shown in Table 5 illustrated that the average initial weights of the experimental groups was almost similar. The average daily body weights gain

were 1096.10, 1061.04 and 1041.56 gm for G1, G2 and G3 respectively. The differences in body weight gain between experimental groups were not significant. These results indicated that the use of canola meal in concentrate feed mixtures containing different levels of canola meal had no negative effect on daily gain. On the other hand, results in Table (5) indicated that the overall average daily gain was 1066.23 g/h/d. These values of average daily gain for buffalo calf groups in the present study are higher than those reported by some investigators in Egypt when buffalo calves fed CFM and roughages. Baraghit *et al.*, (1999) reported 700 g/h/d. El-Shinnawy *et al.*, (1999) reported 890 g/h/d, Etman *et al.*, (2001) reported 814 g/ h/ d, Abdel-Baki *et al.*, (2003) reported 835 g/h/d, Boraei (2003) reported 760 g/h/d, El-Kholy *et al.*, (2003) reported 1003 g/h/d and El-Basiony *et al.*, (2003) reported 969 g/h/d. These differences in ADG reported by different investigators may due to different plane of nutrition used.

On the other hand results in Table 5 indicated that no significant differences were observed in intake of DM, TDN and DCP with increasing the level of canola meal in the experimental CFMs. Also, feed conversion (Kg DM, TDN and DCP / Kg gain) was similar for different dietary treatments. These results are in agreement with those of Mostafa *et al* (1998), El- Shinnawy *et al* (1999), Baraghit *et al* (1999), Etman *et al* (2001) and Abdel Baki *et al* (2003) with native buffalo calves.

As presented in Table 5, average costs in L.E. for one Kg. gain for G1, G2 and G3 were 9.92, 9.46 and 9.24 respectively. On the other hand, economical efficiencies were found to be 1.51, 1.59 and 1.62 for G1, G2 and G3 respectively. Cost / Kg. weight gain and economical efficiency were in favour of the highest percentage of canola meal in

Table (4) : Blood serum parameters for buffalo calves fed experimental rations

Items	TP (g/100 ml)	AL (g/100 ml)	GL (g/100 ml)	AST (U/L)	AIT (U/L)
G1	6.96 a	3.66 a	3.30 a	40 b	26 a
G2	6.92 a	3.50 a	3.42 a	43 ab	27 a
G3	6.88 a	3.40 a	3.48 a	46 a	27 a

a, b, and c means in the same column with different letters are significant ($P < 0.05$)

Table (5) : Effect of feeding experimental CFMs on mean buffalo calf performance

Items	G1	G2	G3
No. of animal	5	5	5
Ave. Initial weight (Kg.)	274.4	273.6	275.4
Ave. Final weight (Kg)	443.2	437.0	435.8
Daily gain (g / h / d)	1096.10 a	1061.04 a	1041.56 a
DM intake (Kg/h/d)			
CFM	7.832	7.606	7.621
Rice straw	4.335	4.358	4.211
Total DM intake	12.167 a	11.964 a	11.832 a
Total TDN intake	7.979 a	7.810 a	7.720 a
Total DCP intake	1.010 a	1.020 a	1.020 a
Feed efficiency (Kg / Kg gain)			
DM	11.10 a	11.28 a	11.36 a
TDN	7.28 a	7.36 a	7.41 a
DCP	0.92	0.96	0.98
Cost / Kg gain (L.E) *	9.92	9.46	9.24
Cost improvement %	0	4.64	6.85
Economical efficiency **	1.51	1.59	1.62
Eco. Eff. Improvement %	0	5.30	9.93

a, b, and c means in the same column with different letters are significant ($p < 0.05$)

* Based on the assumption that the price of one ton of CFM 1, CFM 2, CFM 3 and Rice straw (820, 790, 745 and 65 L E) respectively, the price of 1 Kg body weight gain was 10.50 L.E.

** Economical efficiency (as a ratio between price of the weight gain and cost of feed consumed).

concentrate feed mixture (6.85 and 9.93%, respectively).

CONCLUSION

Under the circumstances of this study, it can be concluded that there are no detrimental effect for the usage of canola meal in buffalo calves and it cause decrease in cost of gain produce and improve in economical efficiency.

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استخدام كسب الكاتولا في العلف المركز لتسمين عجول الجاموس

اسامة عبد السلام محمد – طارق عبد الوهاب دراز

معهد بحوث الانتاج الحيواني – مركز البحوث الزراعية – وزارة الزراعة

استخدم في هذه الدراسة خمسة عشر عجل جاموسى بمتوسط وزن ٢٧٤,٥ كجم قسمت الى ثلاثة مجموعات متشابهة في تجربة تغذية لدراسة تأثير انخال كسب الكاتولا في العلف المركز المخلوط لتسمين الجاموس بنسب مختلفة (صفر ، ١٥ ، ٣٠ %) . وقد تم تغذية الحيوانات في المجاميع المختلفة على العلف المركز بنسبة ٢,٥% من وزن الجسم بينما تركت التغذية الخشنة (قش الارز) للشبع. وقد تم تقدير معاملات هضم المركبات الغذائية وبعض قياسات سيرم الدم ومعدل النمو اليومي والكفاءة الغذائية والاقتصادية.

ومن نتائج الدراسة يتضح انه لا يوجد تأثير ضار من استخدام كسب الكاتولا في تغذية عجول التسمين الجاموسى كما انه في ظل ظروف اسعار السوق وقت اجراء للتجربة كان لاستخدام كسب الكاتولا تأثير على تقليل تكلفة لنتاج كجم النمو وزيادة الكفاءة الاقتصادية