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Growth performance of feedlot weaners cattle fed diet containing different levels of cold press soya bean oilcake

M.J. Chipa[1#], F.K. Siebrits[2], M.M. Ratsaka, K-J. Leeuw and B.D. Nkosi
[1]ARC-Animal Production Institute Private Bag X 2, Irene 0062, South Africa
[2] Department of Animal Science, Tshwane University of Technology, Private Bag X 680, Pretoria 0001

Abstract

The value of cold press soya bean oil cake (CPSBOC) as the source of protein in beef cattle was evaluated. CPSBOC was included in the diets of beef weaners at different levels i.e. 0%, 6%, 13% and 20%. The control diet contained cotton seed oil cake (CSOC) as a protein source. The diets were formulated to be isonitrogenous. A total of 40 weaners (20 heifers and 20 steers) at an average weight of 192.3 ± 20 kg were used. The experiment was a randomized block design with ten replicates per treatment and was conducted over 98 days. The group mass of the steers (700 ± 7.80 kg) was significantly heavier when compared with the heifers (6480 ± 7.80 kg). The average daily gain (ADG) (1.5 ± 2.72) and feed conversion ratio (FCR) (5.5 ± 0.051) of the steers was significantly better than the heifers (1.35 ± 2.72 and 5.7 ± 0.051, respectively) while the steers consume more feed (8.2 ± 14.4 kg) per day as compared to the 7.4 ± 14.4 kg consumed by heifers. The weaners that were fed the diet containing 6% and 13% inclusion of CPSBOC grew significantly better than the other treatments. According to this study, an inclusion level of CPSBOC of between 6 and 13% will yield suitable growth in feedlot cattle. More research is needed to determine the optimum inclusion level of CPSBOC.

Keywords: Steers, heifers, feed intake, feed conversion ratio, growth
[#]Corresponding author: Jonas.Chipa@Gauteng.gov.za

Introduction

Fattening of calf though out the feedlot is intensive method. The feed cost of feedlotting animals is approximate 70 - 80% of the total cost (Henning, 1999). Protein concentrations mostly originate from vegetable by-products. A by-product, cold press soya bean oil cake (CPSBOC), is derived from the processing of soyabeans in the bio-diesel industry. Faldat (1991) indicated that the by-product feedstuff has the nutritional value for animal production. The processing industry of bio-diesel in the Gauteng Province produces a large quantity of oil cake as a waste which can be a possible alternative source of protein for livestock. The study of Kandylis *et al.* (1992) indicated that feeding a by-product after processing could boost the cost-effectiveness of an animal feed. The aim of this study is to evaluate the CPSBOC derivative from the bio-diesel industry in terms of growth, feed intake (FI) and feed conversion ratio (FCR) of beef cattle to determine the best inclusion level.

Materials and Methods

The study was conducted at the feedlot facility of the Agricultural Research Council, Irene, South Africa. The CPSBOC was produced and supplied by Ilanga oils, Meyerton, South Africa. A total of 40 Nguni cattle weaners at the age of 6 to 8 month (20 male and 20 females) at an average weight of 193 ± 6.45 kg were used in a complete randomized block design in a 98 day feeding trial.

Animals were allocated to four different feed treatments of CPSBOC at the levels of 0%, 6%, 13% and 20% hereafter referred to as treatment 1, 2, 3 and 4 respectively (Table 1). Upon arrival, the animals were treated against internal and external parasites, and for any possible bacterial and viral infections. All the animals were implanted with a growth promoter (Ralgro®) at the back of the ear. Five steers and five heifers were allocated randomly blocked by weight to each of the treatments. The animals were provided with fresh water and feed at *ad libitum*. The animals were weighed at the beginning of the trial and thereafter every two weeks. The amount of feed fed every day was recorded and orts were weighed out once a week and were recorded. Data for the FI, average daily gain (ADG) and FCR were calculated. Means of FI, ADG and FCR were compared among the treatments using analysis of variance using the Genstat (2002) programme. The difference between means of the main effect as well as possible interactions was tested.

Table 1 The total mixed ration for all four treatment for growing beef cattle

Ingredient (%)	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Maize meal	57.2	55.6	49.8	50.1
Wheat bran	10.0	10.3	13.6	5.0
Molasses meal	10	10	10	10
Dried brewers grain	5.09	3.56	0	0
Eragrostis curvula hay	10	12	12	13
Cold press soya bean oil cake	0	6	13	20
Cotton seed oilcake	5	0	0	0
Feed lime	1.4	1.4	1.4	1.4
Urea	0.66	0.5	0	0
Salt	0.5	0.5	0.5	0.5
Premix[a]	0.15	0.15	0.15	0.15

[a] Premix = Vitamin A 400000 IU, vitamin B_3 3 g, monensin 33 g, manganese 10 g, zinc 10 g, copper 5 g, iodine 0.025 g, cobalt 0.25 g; magnesium 150 g and selenium 0.3 g.

Table 2 Chemical composition of the total mixed rations for the four treatments for growing beef cattle

Ingredient (g/kg)	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Dry matter	860	888	876	873
Crude protein	135	137	133	138
Crude fibre	95.6	83.0	81.5	81.5
Fat	27.5	43.0	36.5	42.2
Neutral detergent	267	271	296	285
Calcium	7.9	7.6	7.8	7.5
Phosphorus	3.0	2.8	3.4	4.0

Results and Discussion

Initial live mass of the steers and heifers was not different (Table 3). The final mass of the steers was heavier when compared with the heifers. The higher weight gain could be due to the higher feed intake. The results of animal performance are illustrated in (Table 4). The final mass of the weaners indicated that the inclusion of CPSBOC is more heaver as compare to CSOC. This agrees with the finding of Rumsey *et al*. (1999) who indicated that steers were heavier at the end of the trial when different levels of soya bean were supplemented. Kandylis *et al*. (1992) found that the ADG and daily feed intake DFI of male lambs to be higher when compared with female lambs when supplemented with CSOC.

The control diet containing zero CSOC indicated lower performance than the other treatments except for the higher inclusion treatment (20%). These results support the findings of Omar (2000) who indicated that inclusion of 10 and 20% of sesame oil cake increased performance than the control group of SB oil cake. An increased growth rate of 13% could be expected by the better feed intake. The results of the current study also agree with the findings of Alboro *et al.* (1993) who reported that increasing the level of ether whole raw or extruded soya bean improved the growth of the animals.

Conclusion

Cold press soya bean oil cake which is a by-product from the processing of bio-diesel has potential to be used as a protein supplement to beef cattle. The result indicated that the 6% and 13% inclusion of cold press soya bean oil cake is the better inclusion in terms of the growth and FCR. However, more studies are needed to be done with inclusion levels in between 6% and 13% to determine the ultimate optimum level. According to literature the soya bean oil cake can be included up to 35% (Ewing, 2006). However according to these findings it is a waste to add so much in the diet.

Table 3 Effect of gender on the FCR, ADG (kg/day) and FI (kg) of feedlot cattle

Parameters	Unit	Gender		SEM[1]	P-value[2]
		Heifers	Steers		
No. of cattle		20	20	-	-
Initial mass	Kg	187	199	6.450	0.212
Final mass	Kg	324[b]	350[a]	7.80	0.001
FCR	kg diet/kg gain	5.7[a]	5.5[b]	0.051	0.007
ADG	kg/day	1.3[b]	1.5[a]	0.072	0.001
FI	kg/DM	7.4[b]	8.2[a]	0.144	0.001

[a,b] superscript indicated significant different (P <0.05) among value in the same row.
[1]SEM = standard error of means.
[2]P-value = profitability value.

Table 4 Effect of diets on the feed conversion ratio, average daily gain (kg) and daily feed intake (kg) of feedlot cattle

Parameters	Unit	Treatments				P-value*	SEM*
		0 %	6%	13 %	20 %		
Initial mass	kg	189.3	192.3	198.7	191.1	0.895	9.13
Final mass	kg	321.8[b]	340.8[a]	350.6[a]	334.2[ab]	0.033	7.80
ADG	kg/day	1.3[b]	1.5[a]	1.5[a]	1.4[a,b]	0.033	4.30
FCR	kg diet/ kg gain	7.6[a]	6.6[b]	6.6[b]	6.8[ab]	0.039	0.144
FI	kg dry matter	9.97	9.91	10.02	9.48	0.803	0.22

*SEM = standard error of means. *P-value = profitability value. [a,b] superscript indicated significant different (P <0.05) among value in the same row.

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