On-farm evaluation of mixture of noug seed cake and wheat bran supplementation for fattening of oxen in Bahir Dar Zuria district

Addisu Bitew, Yenesew Abebe, Asresu Yitayew, Adebabay Kebede and Wude Tsega

Andassa Livestock Research Center, P.O.Box 27, Andassa, West Gojjam, Ethiopia

Abstract

Fattening trial of draught oxen was conducted at two rural kebeles (Robit Bata and Sosetu Yenesa) in Bahir Dar Zuria district to evaluate the contribution of mixture of noug seed cake and wheat bran supplementation compared to farmers' feeding practice on body weight changes and economic return. Final body weight and average daily gain (ADG) from 1-45 days were significantly ($p<0.05$) higher for the concentrate supplemented oxen. Though body weight gain, ADG from 1-15 days and 1-75 days were higher for the supplemented oxen, the differences were not statistically significant. Economic analysis showed significantly ($p< 0.05$) higher gross and net return from supplemented oxen than non-supplemented oxen. Therefore, in areas where industrial by-products (noug seed cake and wheat bran) could be purchased in relatively low price, fattening of draught oxen through concentrate supplementation could generate better income from increased body weight and improved body condition of the animals.

Key words: Draught, fattening, supplementation.

Introduction

Ruminant productivity in Sub-Saharan Africa is limited due to the low nutritive value of feeds available for the animals (Van Soest, 1982). The most abundant feeds in Sub-Saharan Africa are over mature natural grasses and crop residues which are limited both in quantity and quality during the dry season resulting in low growth rates (Soller *et al*., 1986; Goe, 1987). Of all ruminants, cattle have been the most important livestock in the provision of draught power and meat in the highlands of Sub-Saharan Africa (ILCA, 1981).

Despite high cattle population in the region, animal performance and return obtained has been low mainly due to poor nutrition. One of the likely ways of alleviating the problem of insufficient meat production is that of increasing productivity through improved feeding management. Traditional cattle fattening is common in the mixed crop livestock system. As

the management and feeding practices are traditional, cattle fattening takes long time and the animal's productivity is low. Hence there is a need to adopt improved feeding practices to make the traditional fattening practice effective and profitable. Thus, this study was initiated with an objective of evaluating weight gain and economic return of fattening oxen through supplementation of mixture of wheat bran and noug cake.

Materials and methods

The study area and farmers selection

The trial was conducted in two rural *kebeles,* Robit Bata and Sosetu Yenesa, in Bahir Dar Zuria district. Ten volunteer farmers with better fattening experience and have participated in the study.

Experimental animals and feeding management

A total of ten draught oxen (six in supplemented and four in non supplemented group) were used for this experiment. The oxen selected were dewormed for internal parasites before the commencement of the trial and monitored for their health status during the experimental period. There were two treatments, i.e. concentrate supplemented (49.5% noug cake + 49.5% wheat bran + 1% salt + Basal feed/hay) and non-supplemented (farmers fattening practice). The supplemented group was offered 3 kg day^{-1} concentrate feed during the period of the experiment in addition to natural pasture hay used as basal diet. One kilogram concentrate feed costs 2.10 ETB. Participant farmers in the non supplemented group fed their fattening oxen hay/crop residues and local brewery by-product when available. The oxen were offered water twice daily.

Data collection and statistical analysis

Data on initial and final body weights and price of oxen were collected. The average initial body weights for supplemented and nonsupplemented groups were 326.4 kg and 289.9 kg, respectively. Body weights of oxen were taken every two weeks to know the live weight change of the oxen during the experiment. Body weight of the oxen was estimated from heart girth (HG) measurement using a prediction equation of Y = 4.81HG - 432.73 (r =

0.81, p<0.001, n = 573) developed for Boran cattle (Nicholson and Sayers, 1987). The feeding trial was conducted for 75 days after 15 days acclimitization period. Analysis of data on body weights and price of oxen was carried out using the General Linear Model (GLM) procedure of SPSS (2007). Treatment was included as classification variable, while initial body weight was included as covariate in the model when it was significant. The statistical model used was as follows:

$Y_{ij} = \mu + t_i + b + (Inwt_{ij} - Inwt) + e_{ij}$

Where, Y_{ij} = the observation on weight gain, price of animal

μ = the overall mean

t = the effect of treatment

b = linear regression of initial body weight (Inwt) on subsequent body weight gains

e_{ij} = Effect of random error

Partial budget analysis

The partial budget analysis was based on the calculation of the total cost of the basic ration (hay) and supplemented feed (concentrate) and considering averages of initial and selling price of oxen. Partial budget analysis was employed to compute average cost of production, gross and net income from sale of oxen in each treatment group. Costs (medicament, labor) that were similar in each treatment group were not included in the analysis.

Results and discussion

The oxen showed body weight gain during and at the end of the trial. The difference in average initial body weight between supplemented (326.4 kg) and non supplemented groups (289.9 kg) was not statistically significant. At the end of the experiment, weight of the supplemented oxen was 366 kg with an average weight gain of 39.6 kg, while that of the non-supplemented group was 318.4 kg with an average weight gain of 28.5 kg. Final body weight and ADG from 1-45 days were significantly (p<0.05) higher for the concentrate supplemented oxen. Though weight gain, ADG from 1-15 days and 1-75 days were higher for the supplemented oxen, the differences were not significant (Table 1).

Table 1. Least square means of initial body weight, final body weight and average daily gain (ADG) at different days for fattening oxen.

Parameter studied	Supplemented(N=6)	Non-supplemented(N=4)	Level of sig.
Initial heart girth (cm)	153.5 ± 4.08	150.3 ± 5.0	NS
Initial body wt (Kg)	326.4 ± 13.53	289.9 ± 14.12	NS
Final heart girth (cm)	166.7 ± 2.65	155.3 ± 3.24	*
Final body wt (Kg)	366 ± 9.41	318.4 ± 11.56	*
Body weight gain (Kg)	39.6 ± 13.6	28.5 ± 16.7	NS
ADG from 1-15 days (Kg)	1.07 ± 0.38	0.07 ± 0.46	NS
ADG from 1-45 days (Kg)	0.72 ± 0.12	0.15 ± 0.17	*
ADG from 1-75 days (Kg)	0.57 ± 0.09	0.31 ± 0.11	NS

* = Sig (p<0.05), NS = Not significant

Similar fattening trial conducted by Adane and Ashenafi (2005) at Adamitulu Agricultural Research Center using Arsi draught oxen supplemented with 2 kg noug seed cake to teff straw showed 46.5 Kg weight gain in 90 days fattening period among the other treatments. The group of animals fed on this ration gave the highest average net return (344 ETB) per animal. Tesfaye *et al.* (2002) in a study conducted at ILRI (International Livestock Research Institute), Debre Zeit research station also reported that supplementation of wheat bran had a significant effect on final body weight in highland zebu oxen fed teff straw as basal diet. The average body weight gain was 459 g/day for medium level of supplementation (2.75 kg/head/day) which performed better in terms of feed conversion efficiency and cost of dry matter per kg body weight.

The difference in estimated initial average price of supplemented (1900 ETB) and non-supplemented (1662 ETB) oxen was not statistically significant (Table 2). Average selling price of supplemented oxen was 3775 ETB, while the nonsupplemented group was 2575 ETB. Economic analysis showed significant (p<0.05) difference on gross and net return between supplemented and non-supplemented oxen. The supplemented animals had a gross return of 1875 ETB, while the non supplemented group had a gross return of 913 ETB. Net

return was 1065.00 and 463.00 ETB for supplemented and non-supplemented groups, respectively (Table 2).

Table 2. Partial budget analysis for fattening oxen supplemented with mixtures of noug seed cake and wheat bran.

Parameter studied	Supplemented (N=6)	Nonsupplemented (N=4)	Level of significance
Average initial price of oxen	1900.00	1662.00	NS
Average selling price of oxen	3775.00	2575.00	*
Gross return	1875.00	913.00	*
Costs	810.00	450.00	
Concentrate feed	472.50	-	
Hay	337.50	450.00	
Net return	1065.00	463.00	*

* = Sig ($p<0.05$), NS = Not significant.

Conclusion and Recommendation

Economic analysis showed significantly higher gross and net return from supplemented oxen. Therefore, in areas where industrial by-products (noug seed cake and wheat bran) could be purchased in relatively low price, fattening of draught oxen through concentrate supplementation could generate better income from increased body weight and improved body condition of the animals.

Acknowledgements

References

Adane Hirpa and Ashenafi Mengistu. 2005. Economics of different supplement options to teff straw for fattening Arsi oxen. Asfaw Yimegnuhal and Tamrat Degefa (Eds). Proceedings of the 12th Annual conference of the Ethiopian Society of Animal Production (ESAP), August 12-14, 2004. ESAP, Addis Ababa, 410 pp.

Goe, M.R. 1987. Animal traction on smallholder farms in the Ethiopian highlands. PhD dissertation. Department of Animal Science, Cornell University, Ithaca, New York.

ILCA (International Livestock Centre for Africa). 1981. Animal traction in Sub Saharan Africa. ILCA Bulletin 14, Addis Ababa, Ethiopia.

Nicholson M.J. and. Sayers A.R.. 1987. Relationships between body weights, condition score and heart girth changes in Boran cattle. Trop. Anim. Hlth Prod. (1987) 19, 115-120.

Soller, H., Reed, J.D., and Butterworth, M.H. 1986. Intake and utilization of feed by work oxen. ILCA Newsletter Vol. 5 No. 2, Addis Ababa, ILCA.

Statistical Procedures for Social Sciences (SPSS). 2007. (Version 16.0). Statistical Procedures for Social Sciences (SPSS) INC, Chicago, USA.

Tesfaye Wolde Michael, P.O. Osuji, Asfaw Yimegnuhal and Alemu Yami. 2002. Effect of wheat bran supplementation on feed intake, body weight change and retained energy in the carcass of Ethiopian highland zebu (*Bos indicus*) oxen fed teff straw as basal diet. Proceedings of the 9ᵗʰ Annual conference of the Ethiopian Society of Animal Production (ESAP), August 30-31, 2001. ESAP, 433pp.

Van Soest, P.J. 1982. Nutritional ecology of the ruminant. O and B books, Corvallis, Oregon.