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Gross Margin Analysis of Supplementary Feeding and Twinning in Tswana Goats

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Abstract : Data for this study was derived from a feeding experiment where the effect of nutrition on reproduction of Tswana goats was investigated. Gross margins were calculated for two groups of animals; Supplemented (S, n = 19) and No supplementation (NS, n = 20). The trial lasted nine months whereby a total of 69.4 kg/doe of sorghum stover base diet was offered to S group from mating to weaning. Fertility rate, kidding rate, survival rate to weaning and dam weight at weaning were not affected by supplementation ($P > 0.05$). However, weaning weight of S kids tended ($P = 0.097$) to be higher than NS kids (14.1 vs 12.3 kg). Productivity Index was higher ($P < 0.001$) for S than NS animals (22.5 vs 15.4 kg). Supplementary feeding was utilized by the does for body gain, reproduction and milk production, therefore the anticipated income from dams when slaughtered were included in the calculations. Calculations for gross margins *per* doe were 291.85 for S and 286.94 *Pula* for NS, only 4.95 *Pula* difference. It has been found that 50% or more of Tswana goats bear twins. Calculations were extended for Supplemented Twin bearing does (ST) and No Supplemented Singleton bearing does (NSS). It was found that the difference in gross margins *per* doe between ST and NSS (270.31 vs 253.93 *Pula*) was improved. This amounted to a difference of 16.38 *Pula*. Even though weaning weights were low (10.8 vs 14.6 kg; $P < 0.05$) for ST than NSS kids, the improvement was a result of kidding rate and high survival rate. This shows that supplementary feeding of indigenous Tswana goats is profitable though the margins are low. However, if supplementary feeding is practiced on twin bearing does, gross margins improves greatly, indicating that multiple birth contributes positively to profitability of Tswana goats.

Key words : Tswana goats, Gross margin, Reproduction, Supplementary feed, Multiple birth

Introduction

For Botswana farmers with limited resources, goat production offers an opportunity to alleviate hunger, augment household income and improve living standards (Madibela et al 2002). This is importantly so since unlike cattle whose ownership is limited to a small proportion of the population (ie 67208 households), goats are found in a larger proportion of the population (ie 92486 households) (CSO 2003). Furthermore CSO (2003) found that in 1999 ninty-nine percent of national goat flock was in the traditional sector where the indigenous Tswana goat is mostly found. Due to the high frequency of twinning in the Tswana goat (Madibela et al 2002) their numbers can increase rapidly. However, the offtake has been shown to be relatively low at 8.8% and home slaughter at 5% being more important than sales (CSO 2003). Promoting markets for goats will help augment the incomes of smallholder traditional farmers. This study investigated the gross margin of supplementary feeding and twinning in Tswana goats.

Materials and Methods

Data was derived from a feeding experiment where the effect of nutrition on reproduction of Tswana goats was investigated (see Madibela *et al.*, 2002 for details). Prices of goats *per* dress weight were sourced from a sample of three butcheries in Gaborone city. Liveweights of animals were converted to dress weight according to the formula; Dress weight = 0.415x liveweight (Owen and Norman 1977). The profitability was estimated by quantifying margins over costs of feed, drugs and labour for the two groups of animals; Supplemented (S; n = 19) and No Supplementation (NS; n = 20). A total of 69.4 kg/doe of a stover-based feed was used during the nine months supplementation period for the S and ST groups from mating to weaning. Reproduction and production parameters were recorded to compute productivity index of the animals. Labour for S and NSS groups involved the preparation and dispensing of feed in addition to the common labour costs of herding. The cost of the buck was assumed to be similar between the groups. The revenue from manure was not considered since manure is not commonly sold. Supplementary feeding contributed directly to body condition of the doe and therefore the analysis considered how much income would be generated if a doe was sold at weaning. Based on the above assumptions a gross margin for S, NS, ST and NSS groups were estimated whereby gross income minus total variable costs resulted in gross margin (Makeham and Malcolm 1986).

Results and Discussion

The gross margins for supplementary feeding and for twinning are shown in Table 1 and 2.

Supplementation (S vs NS) had no effect on fertility rate and kidding rate (Madibela *et al.*, 2002) indicating that under the circumstances described by the present study, nutrition was not a driving force in reproduction. However, weaning weight and kid survival rate were different suggesting influences of nutrition in kid viability. Thus kid Productivity Index was high for S than for NS. Kid Productivity Index and Dam weight at weaning elevated income generated from S than NS.

Table 1: Effect of supplementary feeding on reproduction and gross margin

Variable	Supplemented (S)	Non Supplemented (NS)
Reproduction parameters		
Fertility rate (%)[1]	89.5	90.0
Kidding rate (kid/doe)[2]	1.69	1.65
Weaning weight (kg)[3]	14.1	12.3
Kid survival to weaning (%)	96.3	86.2
Dam weight at weaning (kg)	40.6	38.6
Kid productivity index (kg/doe)[4]	22.5	15.4
Income		
Income of kid dressed weight (Pula)[5]	121.39	83.08
Income of dam dressed weight (Pula)	219.04	208.25
Gross income (Pula)[6]	340.43	291.33
Variable Costs		
Total amount of feed used (kg)[7]	69.4	0
Feed cost per doe (Pula)	43.80	0
Drug and dip costs per doe (Pula)	1.75	1.75
Labour costs per doe (Pula)	2.99	2.64
Total variable costs (Pula)	48.54	4.39
Gross margin per doe (Pula)	291.85	286.94

Percentage of does that kid out of total does exposed to buck
No of kids born alive per doe kidding
Weaning was adjusted for 150days by formula (ADG x150) + birth weights
Fertility rate x kidding x survival x weaning weight
Dress weight = 0.415 x liveweight (Owen and Norman, 1977)
Prices = P13.00/kg dress weight
Amount of feed used from mating to weaning
Pula is equivalent to 0.2054 US $

Table 2 : Effect of kidding rate (twinning or singleton birth) on gross margin

Variable	Supplemented twinning (ST)	No Supplemented Singleton (NSS)
Reproduction parameters		
Fertility rate (%)	90.0	90.0
Kidding rate (kid/doe)	2	1
Survival rate (%)	95.2	71.4
Weaning weight (kg)	10.8	14.6
Kid productivity index (kg/doe)	18.5	9.38
Dam weight at weaning (kg)	40.6	38.5
Income		
Income of dam dress weight (Pula)	219.04	207.71
Income of kid dress weight (Pula)	99.81	50.61
Variable costs		258.32
Total amount of feed used /doe (kg)	69.4	0
Feed costs per doe (Pula)	43.8	0
Drug and dip costs per doe (Pula)	1.75	1.75
Labour costs per doe (Pula)	2.99	2.64
Total variable costs (Pula)	48.54	4.39
Gross margin (Pula)	270.31	253.93

Gross margin only differed by about 5 *Pula per* animal between the groups because NS did not have any feeding costs. However, for supplemented twins *versus* no supplemented singleton, the gross margin was higher than the former by 16 *Pula per* animal. This was improved by higher survival rate and kid productivity index even though weaning weight for the twins was low. This indicates that multiple births can contribute positively to profitability of Tswana goats.

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