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Performance Assessment of Pregnant Ewes Fed Broiler Litter as Feed Supplement

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Abstract: Four low cost feed samples were formulated using 0, 25, 50 and 75% levels of broiler litter processed into feed along with other feed ingredients. All the animals were dewormed using Ivermectin and dipped against ticks and fleas using diazintol. Estrus was artificially synchronized in all the animals using Prostaglandin 2F-alpha, the animals were mated with rams of known fertility and lineage bred. They were evaluated in a pregnancy and pre-weaning growth trial. All the ewes were weighed before pregnancy and bi-monthly thereafter until parturition. The parameters studied were weights before and after parturition, weight gain in pregnancy, weight changes in lactation and nursing, lambs birth weights and daily weight of lambs, dam's weight at weaning and gestation length. It was observed that weight at mating, weight before mating, weight at parturition, gestation length, weight gain in pregnancy, weight change in lactation and nursing, lambs birth weights and daily weight gain of lambs were significantly affected ($p<0.05$) while dam's weight at weaning and lambs' weaning weight were not affected ($p>0.05$). Results of this study indicate that inclusion of broiler litter up to 50% in feed mixtures of ewes has no deleterious effect on the performance and health status of ewes during pregnancy and lactation.

Key words: Ewes, pregnancy, parturition, lactation, broiler litter

Introduction

In any given region of the world, the major factor influencing livestock production is an adequate supply of nutrients such as protein, energy, minerals and vitamins.

Caloric intake remains sub optimum for most of the population in the developing world. Haan *et al*., 2001 observed that by 2020, the global population is projected to consume about 120 million tons of meat and 220 million tons of milk above the current consumption. However, the limiting factor in world food supply now and in the foreseeable future is protein leading to a need for improvement in the method of livestock production.

In the tropical regions of the world, the livestock production is plagued with so many problems which include low productivity of animals, poor genetic make up of indigenous animals, non-availability of feed ingredients, shortage of good quality feeds and many more. The limited supply of raw materials for the livestock feed industry has resulted in a continuous increase in the cost of production, causing a phenomenal rise in the unit cost of production of livestock products. Thus, the products have become too expensive for the majority of the population.

The shortage of good quality feeds needed to sustain livestock growth especially during dry season has been a perennial problem and this can be reduced or eliminated by finding alternative sources of protein and energy in the concentrate mixture given to animals.

Broiler litter represents a potentially valuable source of both energy and protein in ruminant diets. It is a readily available and cheap agricultural by-product that can be used as feed. Besides, using broiler litter as a feed; it is environmental friendly.

Ruminants have a unique digestive system that enables them to use a number of non-conventional feedstuffs, which cannot be utilized as nutrient sources by monogastrics animals. Noland *et al*.,1955 observed that broiler litter is a cheap dietary ingredient for ruminants.

However, Tagari *et al*., 1976 reported that broiler litter is better for fattening of cattle, ever since, various concerns has been raised about its use in the diets of pregnant animals.

The objectives of this study are:

(i) To assess the performance of the ewes during pregnancy, when exposed to broiler litter diets.
(ii) To observe the performance of the lambs during the pre-weaning stage of growth.

Materials and Methods

Experimental design and diets: Sixteen primiparous West African Dwarf (WAD) ewes were used in this experiment. The animals were 12 months old with an average weight of 20.66 kg. The experimental design was a completely randomized design consisting of four animals per replicate. The model adopted for this experiment is a one-way analysis of variance in a

Table 1: Gross Composition of Diets

	DIETS			
Ingredients	1	2	3	4
Broiler litter	0	25	50	75
Palm kernel cake	52	27	02	-
Wheat bran	30	30	30	15
Corn bran	15	15	15	07
Salt	2	2	2	2
Palm oil	1	1	1	1
Calc. CP	16.1	17.5	18.8	20.9

Broiler litter used contain 20% Crude Protein and 1400 ME Kcal/kg

completely randomized design. Dietary treatments consisted of 0, 25, 50 and 75% levels of broiler litter inclusion in their diets (Table 1).

Experimental procedure: The animals were treated against endoparasites and ectoparasites infestation with Ivermectin and dipped against ticks and fleas using diazintol. Oestrus was artificially synchronized in all the animals with Prostaglandin 2F-alpha. The animals were mated with rams of good fertility record and lineage bred on the farm. All ewes were weighed before mating and bi-monthly thereafter until parturition.
Parameters studied were: weight at mating (kg), weight before parturition (kg), weight after parturition (kg), weight of dam at weaning (kg), gestation length (days), weight gain in pregnancy (kg), weight change in lactation and nursing (kg), lamb birth weight (kg), ratio of twin: single (%), ratio of male: female (%), weight gain of lambs from 0-13 weeks (kg), lamb weaning weight (kg), daily weight gain of lambs (g), lamb mortality at birth (%) and lamb mortality at weaning (%).

Statistical analyses: All data were subjected to Analysis of variance (ANOVA) procedure using SAS (1999) and significant treatment means were separated using Duncan option of the same package.

Results and Discussion

Table 2 shows the reproductive performance of WAD ewes fed broiler litter based diets.

Weight changes (from mating to weaning) of WAD ewes: Mean weights of ewes at mating ranged from 23.5 kg to 27.8 kg with ewes on ration A having the heaviest mean weight of 27.8 kg and those on ration C having the least mean weight of 23.5 kg. There were significant differences ($p<0.05$) observed between the weight of ewes at mating. In like manner, weight before parturition ranged from 30.0 kg to 35.8 kg. Ewes on ration B had the heaviest mean weight of 35.8 kg while those on ration C had the least mean weight of 30.0 kg. Also, there were significant differences ($p<0.05$) between the ewes on rations A, B, C and D.

Similarly, the weights at parturition ranged from 28.6 kg to 32.5 kg with ewes on ration B having the heaviest mean weight of 32.5 kg and ewes on ration D having the least mean weight of 28.6 kg. Also, there were significant differences ($p<0.05$) observed between these treatments. However, the weight of dam at weaning ranged from 26.8 kg to 29.8 kg. There were no significant differences observed between live weight at mating and duration of pregnancy. The findings of this work do not agree with the findings of Orji (1976) who found no significant correlation between live weight at breeding and length of pregnancy.

Gestation length: Significant differences ($p<0.05$) were observed for the mean gestation length which ranged from 147 days (ration A) to 152 days (ration D). Values for ewes on rations C and D were 150 and 152 days, while those on rations A and B were 147 and 149 days respectively. This result agrees with the report of White and Termonth (1970) as reported by Uwechue (2000) who stated that a low plane of nutrition prolong gestation length. Mean duration of gestation in most sheep breeds varies from 144-155 days (Hafez, 1968). Also, Hill (1960) observed a gestation length of 140-169 days. The results of this experiment are in agreement with the reports of these authors. Forbes (1968) studied the growth of the uterus in pregnant ewes until the 120th day of gestation; he discovered that little depressed change in rumen volume occurred. This suggests that depressed roughage intake which sometimes occur in late pregnancy in ewes could partly be due to physical restriction.

Weight gain during pregnancy: All animals gained weight during pregnancy showing that DM intakes were sufficient both for maintenance and production. Weight gain during pregnancy were highest for animals on ration D (5.3 kg) and significantly lowest ($p<0.05$) for animals on rations A and B (4.1 kg). These values reflect and show the increase in dam body weight due to pregnancy and not total weight gains.
Orr and Treacher (1989) reported that the level of concentrate feeding during pregnancy significantly affect all the aspects of performance. Also, it was observed that gains in late pregnancy increased and losses of body condition were smaller with each increment in the amount of concentrate offered. There were significant effects of concentrate feeding in pregnancy on changes in weight of the ewes in lactation.

Weight changes during lactation and nursing: The values for ewes on rations A, B, C and D were 0.8 kg, 0.7 kg, 0.5 kg and 0.4 kg respectively. Ewes on rations A and

Table 2: Reproductive performance of WAD ewes fed broiler litter based diets

	Treatments			
Parameters	A	B	C	D
Mean wt. at mating(kg)	27.8±1.0^{a}	26.0±0.5^{ab}	23.5±0.3^{c}	24.5±0.3^{bc}
Mean wt. before parturition (kg)	34.4±0.8^{a}	35.8±0.4^{a}	30.0±0.1^{b}	34.9±1.0^{a}
Mean wt. after parturition(kg)	29.5±.2^{ab}	32.5±0.4^{a}	28.9±0.1^{ab}	28.6±1.0^{b}
Mean wt. of dam at weaning(kg)	29.5±2.2	29.8±0.5	28.2±0.1	26.8±1.0
Mean Gestation length(days)	147.8±0.6^{c}	149.3±0.3^{b}	150.8±0.5^{a}	152.0±0.4^{a}
Mean wt. gain in pregnancy (kg)	4.1±0.3^{a}	4.1±0.1^{ab}	5.0±0.2^{ab}	5.3±0.2^{a}
Mean wt. change in lactation and nursing(kg)	0.8±0.0^{a}	0.7±0.0^{a}	0.52±0.0^{b}	0.4±0.0^{b}
Mean lamb birth wt.(kg)	1.6±0.1^{b}	1.0±0.1^{c}	2.1±0.1^{a}	1.7±0.1^{b}
Ratio of twin: single (%)	75:25^{a}	50:50^{b}	50:50^{b}	25:75^{c}
Mean ratio of M: F lambs (%)	75:25^{a}	74:36^{b}	73:27^{b}	30:70^{c}
Mean wt. gain of lambs from 0-13wks (kg)	7.5±0.1^{a}	7.4±0.2^{ab}	7.3±0.1^{ab}	5.9±0.2^{c}
Lamb weaning wt.(kg)	7.0±0.0	8.3±0.5	8.5±0.2	7.6±0.1
Daily wt. gain of lambs (g)	63.6±3.0^{c}	80.9±3.8^{b}	89.1±0.7^{a}	60.7±1.1^{c}
Lamb mortality at birth (%)	0	0	0	20
Lamb mortality at weaning (%)	0	0	0	0

a, b, c, d: Means in the same row with different superscripts are significantly different ($p<0.05$)

B were significantly different ($p<0.05$) from ewes on rations C and D. This result agrees with the study carried out by Adu (1975) who observed that ewes generally lose weight during lactation or gain weight at a very low rate depending on their plane of nutrition.

Types of birth: In all the groups the type of birth was either single or twins. Multiple births were common among treatments A, B and C. The ratio of single to multiple births in treatments A to C was 75:25 respectively.

Significant differences ($p<0.05$) due to treatment were observed between treatments for type of birth. Out of the four ewes per treatment, three ewes in treatment A and two each from treatments B and C gave birth to twins. Uwechue (2000) citing Hill, 1960 and Ngere (1975) stated that twinning rate for WAD sheep vary greatly and range from 20 to 87%, with values from Taiwo (1979) of 51.9%, Ademosun (1973) of 27% and Dettmers *et al.* (1976) of 55% being intermediate. Values obtained in this study were still within the range reported by the various workers cited. In the WAD sheep, the sex ratio of lambs at birth has been reported as 46:54 males to females (Dettmers and Loosli, 1974). The birth weight of the lamb is influenced by age, size, nutrition of the dam, gestation length, sex of the offspring and litter size.

Osinowo and Adu (1985) observed that nutrition exerts a big influence on reproductive performance in sheep. Under-nourishment during late pregnancy may cause pregnancy toxaemia, low birth weight of lambs and poor lamb survival. However under good nutrition and management, at least 80% of ewes mated should lamb with about 25% of the ewes producing twins.

Lamb sex ratio at birth: Significant differences due to treatments were observed between treatments A and B and D for mean ratio of male to female lambs (M: F). Ratios of M: F lambs for rations A, B and C were 75:25 and treatment D was 30: 60. Taiwo (1979) revealed that sex ratio of 48:52 (M:F) and Dettmers and Loosli (1974) obtained sex ratios of 46: 54 (M: F). However in this study, more males were produced than the females therefore, further observations on a larger number of ewes needed to be done in order to ensure that ratios obtained in this study are actually repeatable.

Lamb birth weight and rate of gain up to weaning: The mean birth weight of lambs for rations A, B, C and D were 1.6±0.1 kg, 1.0±0.1 kg, 2.1±0.1 kg and 1.7±0.1 kg respectively. Significant differences ($p<0.05$) were observed between mean lamb weights of rations A, D and B and C.

Also, the lamb weaning weight increased gradually from ration A (7.4 kg); ration B (8.3 kg); ration C (8.5 kg) and a decrease in ration D (7.6 kg). However, there were no significant differences between the lamb weights.

Furthermore, the daily weight of lambs revealed that the animals gained weight with the increase in the rate of inclusion of broiler litter in their diets. Ewes on rations A, B and C gained 63.6 g, 80.9 g and 89.1 g daily, but, the animals on ration D gained less than animals on other treatments. Also, there were significant differences ($p<0.05$) in live weight gains of animals on ration C (89.1 g), ration B (80.9 g) and rations A and D (63.6 g and 60.7 g) respectively.

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