REPRODUCTIVE PERFORMANCE, PLASMA PROGESTERONE PROFILE AND DIGESTIBILITY IN EWES FED RATIONS CONTAINING DIFFERENT NITROGEN SOURCES

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(Manuscript received 8 December 1998)

Abstract

T welve Suffolk crossbred ewes were used in this study. Animals randomly assigned to three equal groups and received three different rationss: control ration (C group), 40% ammoniated corn stover (ACSGROUP) and 10% broilers litter ration (BL group).Experimental period included two months preception, gestation and first five weeks of suckling period.Estrous cycle length was not influenced by the dietary treatments, with overall mean 16 days.Mean gestation lenghth was longer ($P<0.05$) in BL group than C group (152.25 versus 148 days). Litter weight at birth was not influenced by treatment and not correlated with the length of gestation. Conception rate was not influenced by treatment, while, lambing rates decreased. Mean peak concentration of plasma progesterone increased ($P<0.01$) in response to dietary treatments in cycliing ewes but not in pregnant ewes.Twin pregnancies were higher in mean plasma progesterone level than single pregnancies(11.76 versus 8.39 mg/ml). Lambs growths during the first five weeks of suckling period decreased ($P<0.05$) in BL group. The ACS ration had better CP, EE and NFE digestibility. TDN, DCP and the highest daily intake of TDN.

It could be concluded that feeding rations contaning 40% ACS or 10% BL generally maintains the productive and reproductive performance of cycling, pregnant and lactating ewe.

INTRODUCTION

Partial replacement of ration with agricultural by- products will economically be useful in the developing countries. Use of broilers litter or ammoniated roughage as a nitrogen source in sheep ration could be feasible, since sheep, like the other ruminants can adequately utilize nitrogen available in their diet. In addition, broilers litter is the most valuable animal waste because of its relatively high protein content, of which about 50% is present as true protein, and is also relatively high in feed energy and minerals in comparison to other animal wastes (Fontenot *et al.*,1966).

Inclusion of poultry wastes (El-Amary, 1995, and Ahmed, 1996) or ammoniated poor quality roughage (Ahmed 1992,and Yacout, 1993) have been experimented in sheep ration.However, the effect of the these different sources of nitrogen on the reproductive performance of ewes was not invetigated. Therefore, the objective of this study was to investigate reproductivity, plasma progesterone profile and digestilility in the cycling and pregnant ewes fed rations partially substituted with broiler litter or ammoniated corn stover.

MATERIALS AND METHODS

This study was conducted at Nubaria experimental station belonging to the Animal Production Research Institute,Agricultural Resarch Centre. Ministry of Agriculture, Giza, Egypt.

Twelve Suffolk crossbred ewes (3/4 Suffolk and 1/4 Ossimi), 3-4 years old about 60 Kg mean body weight were randomly assigned to three equal groups: control (C)group, ammoniated corn stover (ACS) fed group, and broiler litter(BL) fed group.

Composition of the three experimental rations was as follow:

EXP. group	Untreated Corn stover (%)	ACS ** (%)	Conc. * (%)	Molasses (%)	BL *** (%)
C	40	---	51	9	---
ACS	---	40	51	9	---
BL	40	---	41	9	10

*The conentrate ration was consisted of 16 % Flax cake, 4% Soybean, 40 % Bran, 25% Corn,10% Muffeed, 2.5% Limestone, 2% Sod. chloride, 0.5 % Minerals vitamins mixture. All feed requirements were calculated according to the NRC (1985).

** Corn stover was ammoniated by anhydrous ammonia injected into corn stover bales at the rate of 3 %. Stover bales were tightly closed and covered by a polyethylene sheet before ammoniation. The ammoniated corn stover was left for a reaction period of two weeks.

*** Broiler litter was wheat straw based and dried under solar radiation for 5-7 days, then mixed and pelleted with the concentrate ration.

Each group was kept in a separate shaded pen adapted to the experimental ration for two weeks before starting experiment. Estrous was detected twice daily in all ewes using a vasectomized mature ram. After two months of experiment, all ewes were expoed to one mature ram for natural mating. Diagnosis of pregnancy

was performed 45 days after mating using the Ultrasonic pregnancy detector.

Rations were offered *ad-libitum* twice daily, while, drinking water was available all time. At the third month of pregnancy, digestibility trials were carried out using three randomly selected animals from each group. Faeces was collected quantitatively once a day before the morning meal.Daily representative samples of faeces were taken, oven-dried, ground,and stored for chemical analysis, which was carried out according to A.O.A.C methods (1990).

Blood sampling was carried out twice weekly from cycling and once weekly from pregnant ewes till parturition. Blood sampling was performed by venipuncture of jugular vein, using lithium heparinized evacuated tubes for blood collection. Blood samples were centrifuged and plasma was kept at-20 ^{o}C for progesterone asay.

Plasma progesterone concentration was determined by a no-extraction, Solid phase I^{125} radioimmunoassay technique using a commercial kit (Coat-A-count, Diagnostic product corporation, USA) and a gamma counter (Nucleus, Model 600, USA).

Data obtained were statistically analyzed according to SAS (1988). General linear model (GLM) proced was used.

RESULTS AND DISUSSION

I. Reproductive performance of ewes

1-Estrous cycle length

Mean length of estrous cycly (Table 1), as estimated by daily heat detection using vasectomized ram and confirmed by basal level of plasma progesterone, was found to be 15.44, 16.67 and 15.77 days in C, ACS and groups, respectively. Differences in estrous cycle length among different groups were insignificant. Similar results were obtained by Elwan (1991) in buffalo-heifers. He showed that 30 and 60% BL inclusion in ration did not influence length of estrous cycly. Overall mean length (16 days) detected in this study was 1.3 day shorter than that reported by Aboul-Naga *et al.* (1980) in Suffolk-Ossimi crossbred ewes. Cycle length in the present study ranged between 14 and 21 days. Many factors influence cycle length and ovarian activity in sheep such as breed, age, season and nutrition (Hafez, 1993).

2.Gestation length and birth weight of lambs

Mean length of gestation and total birth weight of lambs born /ewe lambed are presented in Table 1. Gestation length in BL group was significantly longer ($P<0.05$) than that of control (152.25 vs. 148 days) and ACS groups (152.25 vs 146.75). Overall mean length was 149 days. Mouse *et al.* (1994) have shown that gestation length averaged 148.5 days in different breeds of sheep.

In the present study, no relationship could be detected between litter weight and gestation length of ewe ($r=-0.17$). In agreement, Shetaewi (1988) found no relationship between lamb birth weight and gestation length in Rambouillet ewes, while, Mabrouk *et al.* (1976) and Kishore *et al.* (1980) have repoted a significant correlation between both traits in different breeds of sheep and their crosses.

Birth weight of lambs/ewe lambed did not differ significatly among groups, however, the control group exhibited maximum kilograms of lambs at birth (6.55Kg). The higher birth weight of litter in the control group was regarded to the higher rate of laming in this group (175%).Similar results were observed by Ahmed (1992), who reported that inclusion of ammoniated rice straw or poultey litter in the ration did not influence birth weigth of lambs of Suffolk-Ossimi crossbred ewes.

3. Conception rate and lambing rate

Present results showed that coneption rate (ewes conceived/ewes exposed to the ram) was 100% for experimental groups. This indicates that dietary treatments of this study did not affect fertility or conception rate in ewes. However, it was noticed that lambing rate (number of lambs born/ewes lambed) was lower in the treated (125%) than control group (175%), while, both were higher than that reported by Labban *et al.* (1970) and Aboul-Naga (1978) who showed that lambing rate in the Suffolk-Ossimi crossbred ewes was 113.5% and 115.9%, respectively. The higher lambing and conception rates detected in this study may be due to the limited number of ewes employed. Conception rate in Suffolk ewes in Egypt was 74%(Aboul-Naga, 1978), while, in Suffolk-Barki crossbred ewes was 62.5 %(Latif and Abdel-Salam, 1989). On the other hand, difference in litter size at birth was attributed to genetic difference in ovulation rate (Meyer and Clark, 1982), and plane of nutrition (El-Sheikh *et al.* 1955, Lamond *et al.* 1972 and 1973, and Montgomery *et al.* 1983).

4. Growth of lambs

During the first 5 weeks of suckling period, the heaviest body weight of litter was recorded in the control group, followed by ACS and BL groups, respetively (Table1). Average weight gain of litter during this period was 9.68 and 7.21 Kg for

C, ACS and BL groups, respectively. Difference in litter weight BL group and the other two groups was significant (P<0.05). This is probably due to a lowered milk production of dams in response to BL feeding. Slen *et al.* (1961) reported that milk production was a major consideration in determining the body weight gain of suckling lambs. In addition, early studies showed that level of intake during gestation and lactation was reported to have a significant influence on lamb birth weight and subsequent growth rate (Wallace, 1948, Mathews and Madsen, 1960).

II. Plasma Progesterone concentration

1- During estrous cycle

Peak values of plasma progesterone during estrous cycle are presented in Table1, and being higher in treated groups than control group. Differences in peak values of progesterone were significant (P<0.01) among experimental groups. Peak value in the BL group was also higher than significant (P<0.01) among experimental groups. Peak value in the BL group was also higher than that of ACS group (P<0.05).Elwan (1991), however,showed insignificant differences in plasma progesterone concentrations in icycling buffalo-heifers among control and BL fed groups.

Present results indicated that the quality of nutrition may influence blood progesterone level in cycling ewes. Plane of nutrition may also affect blood progesterone level in sheep. Lamond *et al.* (1972) showed that maintenance diet increased plasma progesterone concentration in cycling ewes, especially, on days 10 and 11 of the estrous cycle, as compared with those of ewes kept on grass pasture or on *ad-libitum* balanced diet. On the other hand, plasma progesterone concentration reached its peak between days 7 and 14 of estrous cycle in the three groups. In general, the maximum concentration of progesterone reported by several investigators varied between 1.4 and 6 mg/ml on days 8-14 (Baird *et al.*, 1976 and Kilian *et al.*, 1985).

2.During pregnancy

Mean and concentrations of progesterone during pregnancy are presented in Tables 1 and 2. Changes in plasma progesterone concentration during pregnancy are shown in Figures 1 and 2. Differences in Plasma progesterone concentration during pregnancy due to dietary treatments were insignificant, while, those due to weeks of gestation were significant (P<0.01).

Progesterone level stared to increase gradually at about week 7, reaching its peak at weeks 18 and 19 of gestation in the three exerimental groups (Figure 1).

This accelerated increase in plasma progesterone may be of placental origin (Linzell and Heap, 1968, and Naibandovs, 1970). Similar results were reported by Bassett *et al.* (1969).

Mean concentration of plasma progesterone in the ewes carrying twins was higher than that of the ewes carrying singles (11.76 versus 8.39 mg/ml). Figure 2 showed that difference in plasma progesterone level between single and twin pregnancies started to increase at the eleventh week of gestation and was maintained approximately constant till end of grstation. However, predicting twin pregnancy by blood progesterone level was of 25% accuracy in ewes(Chauhan *et al.*, 1991).

III. Nutrients intke digestibility

Proximate chemical composition, and nutrients intake and digestibility of the different experimental rations are presented in Tables 3 and 4, respectively.

The highest percentage of CP was detected in ACS ration, followed by BL andC rations, respectively, while, the highest percentage of CF and Ash was detected in BL ration, and the other two rations were almost similar.

The highest CF intake was recorded in BL ration., while, DM intake was almost similar in the rations.

Concerning nutrients digestibility, C ration was recorded the lowest DM digestibility, while, BL ration recorded the highest value. On the other hand, ACS and BL rations showed CF digestibility higher than control.The ACS ration had better CP, EE and NFE digestibility. Present results showed that ACS ration had the highest values of TDN and DCP. The positive effect of ammonia treatment of corn stover on the digestibility of the different nutrients was in agreement with the results reported by Wiliams *et al.* (1984), Abdel-Aziz (1986), and Yacout (1987).

It could be concluded from the present results that, including ammoniated corn stover in the ration at 40% level, or replacing 20% of concentrate mixture by broiler litter has no harmful or depressive effect on the reprouductive performance of ewes. However, digestibility trial indicated that the nutritive value of ammoniated corn stover ration was better than that of broiler litter ration.

Table 1. Some reproductive parameters (X±SE) in the control group (c), and ammoniated corn stover (ACS) and broiler litter (BL) fed groups.

Parameter	Experimental Group		
	C	ACS	BL
1. Estrous cycle length (day)	15.44±0.78	16.67±0.78	15.77±0.78
2.Gestation length (day)	148±1.12 ^{a}	146.75±1.12^{a}	152.25±1.12 ^{b}
3.Conception rate (%)	100	100	100
4. Lambing rate (%)	175	125	125
5. Kg Lambs/ ewe lambed			
a-at birth	6.55±0.84	5.06±0.84	5.15±0.84
b- at 5 weeks old	16.23±2.27^{a}	15±2.27a	12.36±2.27^{b}
6.Plasma progesterone concentration (mg/ml)			
a- Peak			
- cycling ewes	3.3.8±0.16^{a}	4.27±0.35 ^{b}	5.17±0.11^{c}
- pregnant ewes	25.78±2.68	23.62±3.89	24.27±1.73
b- Range			
- cycling ewes	0.11-4.12	0.13-5.75	0.11-5.47
- pregnant ewes	2.27-30.95	2.03-31.27	2.20-27.64
c-Mean			
- pregnant ewes	10.63±2.01	9.82±2.22	9.76±1.98

Means int he same row superscribed with different letters differ significantly ($P< 0.5$).

Table 2. Plasma progesterone concentration (X±SE) during pregnancy in the control group (C) and ACS and BL fed groups.

Group	Months of Gestation				
	1	2	3	4	5
C	4.60±0.58	6.01±1.26	7.26±1.93	20.30±5.44	20.77±4.96
ACS	3.86±1.05	2.34±0.68	6.03±1.50	15.86±3.98	20.20±3.69
BL	4.41±0.55	4.65±0.94	8.32±2.45	15.84±4.52	18.65±3.04

Table 3. Proximate analysis of experimental rations calculated as percentages of dry matter.

Ration	OM	CP	CF	EE	NFE	Ash
C	91.26	14.07	13.92	2.39	60.88	8.74
ACS	91.18	15.16	13.82	2.35	59.85	8.82
BL	89.14	14.78	14.49	2.24	57.63	10.86

Table 4. Total nutrients intake (Kg/head/day), digestion coefficiets (%) and nutritive values (%) of experimental rations.

Ration		OM	CP	CF	EE	NFE	Nutritive values	
							TDN	DCP
C	NI	1.09	0.15	0.15	0.02	0.66	0.63	0.08
	DC	57.56	54.74	44.33	72.00	65.77	57.79	7.70
ACS	NI	1.11	0.16	0.15	0.02	0.66	0.76	0.10
	DC	60.80	58.33	47.53	78.35	69.02	60.88	8.85
BL	NI	1.0	0.16	0.16	0.02	0.63	0.61	0.09
	DC	62.15	54.72	57.79	68.89	64.49	55.75	8.08

NI, nutrient intake; DC, digestion coefficient; OM, Organnic matter; DM, dry matter, CP, crude protein; CF, crude fiber; EE, ether extract; NFE, nitrogen free extract; TDN, total digestible nutrients; DCP, digestible crude protein

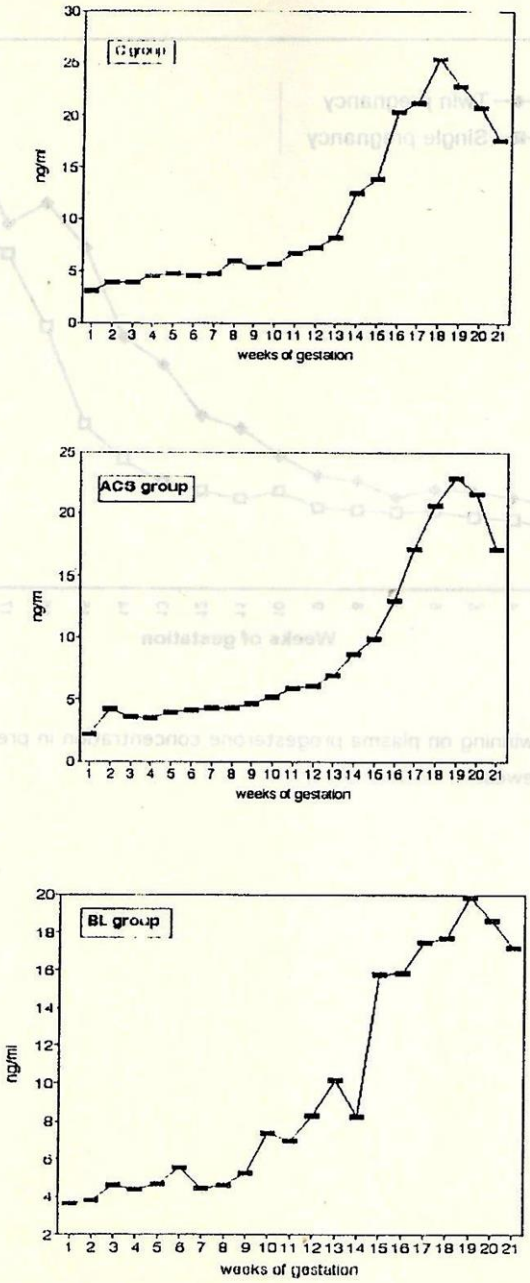

Fig. 1. Mean plasma progesterone concentrations during pregnancy.

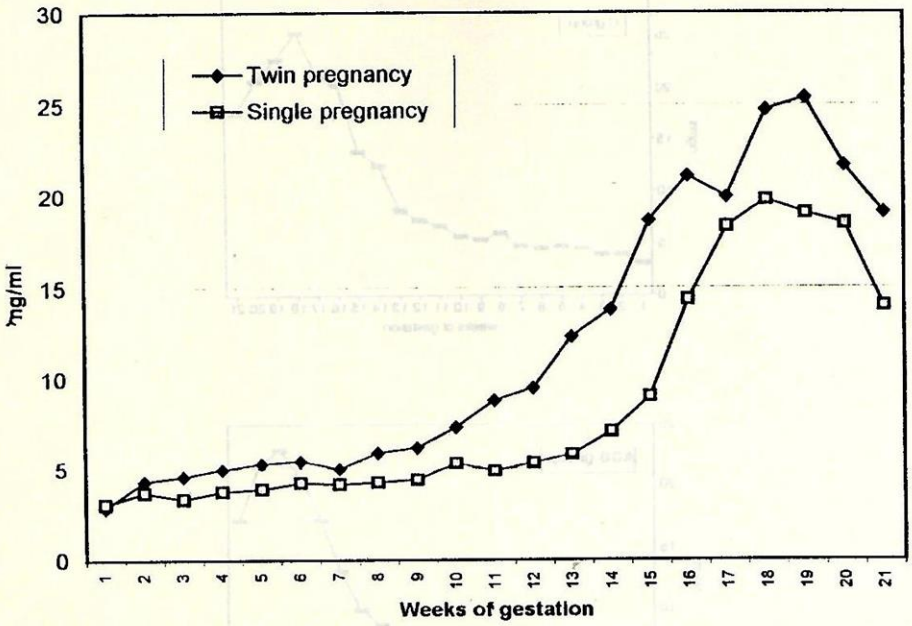

Fig. 2. Effect of twinning on plasma progesterone concentration in pregnant crossbred Suffolk ewes.

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الأداء التناسلي وصورة البروجستيرون في بلازما الدم ومعاملات الهضم في النعاج المغذاه علي علائق تحتوي علي مصادر نيتروجينية مختلفة

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إستخدمت في هذه الدراسة ١٢ نعجة من خليط السفولك مع الاوسيمي. وزعت الحيوانات عشوائيا وبالتساوي علي ثلاث مجموعات تجريبية غذيت بثلاث علائق مختلفة : عليقة مقارنة، عليقة تحتوي علي ١٠٪ فرشة دجاج تسمين.

تضمنت فترة التجربة شهرين قبل الحمل وفترة الحمل والخمسة الاسابيع الاولي من فترة الرضاعة ولقد أوضحت النتائج التالي:-

لم تتأثر طول دورة الشبق بالمعاملات الغذائية وكان المتوسط العام ١٦ يوماً. وكان متوسط طول فترة الحمل أطول (إحتمال خطأ أقل من ٠,٠٥) في المجموعة المغذاة علي فرشة دجاج التسمين عن المجموعة المقارنة (١٥٢,٢٥ مقابل ١٤٨ يوما). لم يتأثر وزن النتاج عند الميلاد بالمعاملة وكذلك لم يرتبط بطول فترة الحمل. لم يتأثر معدل الحمل بالمعاملة بينما إنخفض معدل إنتاج الحملان. زاد متوسط أعلي تركيز للبروجستيرون (احتمال خطأ أقل من ٠,٠١) في الحيوانات التي تشيع ولكن لم يتأثر في الحيوانات الحامل نتيجة المعاملات الغذائية. وجد ان متوسط هرمون البروجستيرون في بلازما الدم أعلي في الحيوانات الحامل بتوأم عن الحيوانات الحامل بمفرد (١١,٧٦ مقابل ٨,٣٩ نانو جرام/مل).

قل نمو الحملان (احتمال خطأ أقل من ٠,٠٥) أثناء الخمسة أسابيع الاولي من فترة الرضاعة في مجموعة فرشة دجاج التسمين. وجد أن العليقة المحتوية علي حطب الذرة المعامل بالنشادر أعطت أفضل النتائج من حيث معاملات الهضم في كل من البروتين الخام، المستخلص الاثيري والمستخلص الخالي من النتروجين، كذلك نسبة المركبات الكلية المهضومة والبروتين الخام المهضوم ومقدار المأكول اليومي الخام، المستخلص الاثيري والمستخلص الخالي من النتروجين، كذلك نسبة المركبات الكلية المهضومة والبروتين الخام المهضوم ومقدار المأكول اليومي من المركبات الكلية المهضومة.

يستنتج من هذه الدراسة ان التغذية علي عليقة تحتوي علي ٤٠٪ حطب ذرة معامل بالنشادر أو ١٠٪ فرشة دجاج تسمين تحافظ بصفة عامة علي الأداء الإنتاجي والتناسلي للنعاج التي تشيع أو الحامل أو المرضع.