

Effect of feeding Sodium Hydroxide Treated Rice Hulls and Date Stones on the Reproductive Performances of Awassi Ewes

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Abstract

Fifty seven Awassi ewes, aged 2 – 3 years, were used in a completely randomized design and allocated to three different diets, ten weeks before mating. Synchronization was commenced mating, using progesterone impregnated intravaginal sponge. Diets 1 was concentrate feed only. Diets 2 included 60% concentrate plus 40% alkali treated rice hulls (50 NaOH in 1L water/kg DM) and diets 3 was composed of 30% concentrate plus 30% ground date stone plus 40% treated rice hulls. The experimental diets were fed four weeks before and four weeks after mating and also six weeks before lambing, at a level of 150% of the maintenance requirements. Between flushing and steaming up, ewes were fed alfalfa and green barley crop at a maintenance level. After lambing ewes were fed green alfalfa ad. Lib. And 500 g/day per ewe concentrate mixture for two weeks, followed by green alfalfa only. For six weeks daily feed intake and weekly live body weights were recorded. A balance trial was carried out using three Awassi rams in a 3x3 Latin square design.

The type of the diets did not have a significant effect on ewes lambing percentage nor on lambs birth weight or growth rate, until eight weeks after lambing. However, date stone may have affected oestrus activity. The results suggest that using treated rice hulls and ground date stone up to 70% of concentrate diet was adequate to meet Awassi ewes requirement during mating and late pregnancy.

تأثير استخدام السبوس المعامل بهيدروكسيد الصوديوم وجريش نوى التمر على الاداء التناسلي
للنعاك العواسية

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الخلاصة

شملت الدراسة سبعة وخمسون نعجة بعمر 2 – 3 سنة وزعت عشوائيا على ثلاثة انواع من العلائق قبل عشرة اسابيع من التسفيد. عوملت النعاك بالأسفنجيات المهبلية المشبعة بهرمون البروجستيرون لتوحيد الشبق. كانت العليقة الاولى علف مركز فقط وشملت العليقة الثانية 60% علف مركز مع 40% سبوس معامل بهيدروكسيد الصوديوم واحتوت العليقة الثالثة على 30% علف مركز مع 30% جريش نوى التمر و 40% سبوس معامل. غذيت علائق التجربة اربعة اسابيع قبل وبعد التسفيد وكذلك ستة اسابيع قبل الولادة وبمستوى 150% من احتياجات الادامة.

غذيت النعاج خلال الفترة بين التسفيد و الولادة بالجث وحشيش الشعير بمستوى الادامة. بعد الولادة غذيت لمدة اسبوعين بصورة حرة على الجث مع 500غرام/ يوم للنعجة علف مركز. تبعها علف اخضر فقط لمدة ستة اسابيع حسب كمية العلف المستهلك يوميا كما تم تسجيل وزن الجسم اسبوعيا. تم اجراء تجربة هضم باستخدام ثلاثة كباش وباستعمال تصميم 3 x 3 المربع اللاتيني.

لم يظهر أي تأثير معنوي للعلائق على نسبة الولادات او على الوزن عند الولادة وكذلك معدل النمو للحملان ولغاية ثمانية اسابيع من العمر ولكن اشر اختلاف العلائق على نسبة ظهور الشبق في النعاج. نتائج التجربة تشير الى امكانية سد احتياجات النعاج خلال فترات التسفيد وقبل الولادة بستة اسابيع باستخدام السبوس المعامل بهيدروكسيد الصوديوم وجريش نوى التمر ولحد 70% من العليقة المركزة.

Introduction

The effect of feeding Awassi ewes high plane of nutrition during mating and late pregnancy on their reproductive performance have been demonstrated by many workers (1, 2, 3). However few attempts were made to examine the effect of using agriculture by-products (mainly cereals straw) on ewes performance (4, 5). Most of the work concerning the use of agriculture by-products was conducted with fattening lambs (6).

Mohammed (6) found that NaOH treated rice hulls can be utilize successfully in fattening Awassi lambs, as reasonable fattening performance were achieved. Though, this experiment was designed to study and compare the performances of Awassi ewes fed complete diets comprising alkali treated rice hulls with or without date stones.

Materials and Methods

Fifty seven Awassi ewes (mean live weight and standard error 37.65 ± 0.55), aged 2 – 3 years were used in a completely randomized design. Ewes were penned indoors into three groups, ten weeks before mating and were mated in mid January after estrus synchronization, using progesterone impregnated intravaginal sponge*. Six Awassi rams wearing (sire sine) harnesses were introduced and mating date was recorded daily.

Ewes were allocated randomly to three different diets. Diet 1 (G1) was concentrate feed only. Diet 2 (G2) included 60% concentrate feed plus 40% alkali treated rice hulls (50 NaOH in 1L water/kg DM) and diet 3(G3) was composed of 30% concentrate plus 30% ground date stone plus 40% treated rice hulls. Table 1 shows the components of the three diets fed. The chemical analyses of the three experimental diets are shown in table 2. Alkali treated used was described by Mohammed (6). The experimental diets were fed four weeks before and four weeks after mating (flushing period) and also during the last 6 weeks of pregnancy (steaming up) at a level of 150% of the ewes maintenance requirement (7). During the period between flushing and steaming up, the ewes were fed alfalfa and green barley crop at a maintenance level. After parturition ewes were fed green alfalfa ad. Lib. And 500 g/day per ewe concentrate mixture for 2 weeks followed by green alfalfa only for six weeks.

Ewes feed intake was recorded daily and live body weights were recorded weekly and their weights were also recorded 24 hours after lambing. Lambs were weighted 2 hours after lambing and then weekly until 8 weeks of age.

*= Vermix , Up john Ltd.

Table (1) components of the experimental diets (%)

| Ingredient | Diet 1 | Diet 2 | Diet 3 |
|----------------------|---------------|---------------|---------------|
| Concentrate mixture* | 100 | 58.00 | 29.41 |
| Rice hulls | -- | 40.00 | 39.52 |
| Date stone | -- | -- | 29.41 |
| NaCl | -- | 0.40 | 0.40 |
| CaCO ₃ | -- | 0.80 | 0.77 |
| Urea | -- | 0.80 | 0.49 |

* = concentrate mixture (wheat bran 45% + barley 37% + soybean 12% +additives 6%)

A balance trial was carried out using three awassi rams in a 3x3 Latin square deign to determine digestion coefficients of dry matter, crude protein, crude fiber and energy. Total feaces voided were collected every day before feeding for seven days and ten percent fecal samples were bulked for each animal during the collection period and preserved at -10°C until were chemically analyzed. A 10-days preliminary period commenced each collection period (8).

Analysis of variance was applied to study the effect of type of diet on the ewe's performances. L.S.D. was used to compare between any two treatments. The data of live barren ewes were excluded from the late pregnancy results.

Results and Discussion

Lambing percentage was used as a preferred measure for describing the general fertility level in flock (9). Table 3 showed that no significant effect of type of diet on ewes lambing percentages (lambing percentage was 94.7, 89.4, and 89.4 for G1, G2 and G3 respectively). The results showed no incidence of twinning in all three groups. However, up to 20% twinning had been reported by younis (1), working on Awassi ewes. Whereas muhammed (3) found no significant effect of flushing on lambing percentage of Awassi ewes. Al-saigh et al. (2) found no significant effect of type of roughages (green, hay and silage) on the live weight changes of Awassi pregnant ewes.

Date stone had been used in the feeding of Awassi sheep (6, 10, 11 and 12). Hamra(12) showed that diet contained 50% date stone fed to breeding ewes effect their fertility. The results of the present experiment indicated that diet contained 30% date stone did not affect ewes fertility. However, date stone may have some effects on oestrus activity (Table 3). It was found that 40% or the ewes in group 3, who fed date stone, were returned to cycle. Hamra (12) suggested that date stone may have contained compound with estrogenic action.

The flushed ewes (Table 4) were increased in weights during the experiment period. No significant difference was observed between groups. The results in table 4 indicates that ewes fed 40% treated rice hulls and date stone can achieve similar performances to ewes fed concentrate diet only.

Ewes mean live weight and live weight changes during late pregnancy are presented in table5. All ewes of the three groups have gained weight during 6 weeks before lambing, no significant differences were observed between groups. However, live weight changes from 6 weeks before lambing to 24 hours post-lambing showed that G2 and G3 have lost weights, whereas G1 gained weight (Table 5). Jassim (14) found no significant effect of types of roughages (green, hay, and silage) on the live weight changes of Awassi pregnant ewes.

Type of diet had no significant effect on lambs birth weigh, growth rate until 8 weeks post lambing (Table 5). Lambs birth weights were 3.90, 4.25 and 4.35 kg for G1, G2 and G3 respectively. However, lambs birth weight for G2 and G3 had slightly heavier birth weights than G1.

The substitution of concentrate diet with agriculture by products (alkali treated rice hulls and ground date stone) up to 70% have reduced the digestion coefficients of dry matter, crude protein, crude fiber and energy significantly ($P<0.01$), table 6. This was probably due to the higher lignin, cellulose and ash content in diets 2 and 3 in comparison with diet 1 (Table 2).

It has been observed that pregnant ewes grazing estrogenic pasture affect their lambing performances (15). The main affect was abortion, uterine prolaps. However the present work did not show any effect on ewes fed 30% ground date stone. The results suggest that using treated rice hulls and ground date stone up to 70% of the concentrate diet was adequate to meet Awassi ewes requirement during late pregnancy.

Table (2) Composition of the three diets fed to experimental ewes

| | Diet 1 | Diet 2 | Diet 3 |
|----------------------------|--------|--------|--------|
| Dry Mater (g/kg) | 941.0 | 898.0 | 947.0 |
| Crude protein (g/kg Dm) | 140.0 | 138.0 | 143.0 |
| Crude fiber (g/kg Dm) | 93.8 | 158.2 | 315.4 |
| Ether extractive (g/kg Dm) | 21.8 | 5.1 | 8.8 |
| Ash (g/kg Dm) | 10.2 | 23.7 | 70.3 |
| NDF (g/kg Dm) | 768.6 | 540.9 | 301.9 |
| ADF (g/kg Dm) | 231.4 | 559.1 | 698.1 |
| Cellulose (g/kg Dm) | 72.7 | 128.4 | 250.4 |
| Hemi cellulose (g/kg Dm) | 128.2 | 291.1 | 253.3 |
| Lignin (g/kg Dm) | 20.3 | 104.2 | 121.3 |
| †Gross energy (MJ/kg Dm) | 18.84 | 18.31 | 17.80 |
| *ME (MJ/kg Dm) | 12.71 | 10.23 | 9.80 |

• = $0.81 \times \text{DE (8)}$

† = Gross energy was determined using a bomb calorimeter.

Table (3) Effect of feeding experimental diets on reproductive performance of Awassi ewes

| | G1 | G2 | G3 | Total mean |
|---|------|------|------|------------|
| No. of ewes | 19 | 19 | 19 | 57 |
| No. of ewes marked by rams | 18 | 16 | 16 | 50 |
| No. of ewes marked in 1 st oestrus cycle | 14 | 15 | 8 | 37 |
| No. of ewes marked in 2 nd oestrus cycle | 4 | 1 | 8 | 13 |
| No. of lambs born alive | 18 | 17 | 17 | 52 |
| No. of ewes lambd | 18 | 17 | 17 | 52 |
| Barrenness | 1 | 3 | 3 | 7 |
| Lambing percentage (%) * | 94.7 | 89.4 | 89.4 | 91.1 |

* = No. of lambs born alive/No. of ewes joined with rams.

Table (4) Ewes feed intake and live-weight changes during flushing period

| | G1 | G2 | G3 | SIG | S.E.D |
|--|-------|-------|-------|-----|-------|
| No. of ewes | 19 | 19 | 19 | | |
| Ewes initial weight (kg) | 36.25 | 37.61 | 38.34 | | |
| Ewes weight at mating (kg) | 38.36 | 39.42 | 41.76 | NS | 1.5 |
| Ewes weight 3 weeks after mating (kg) | 41.4 | 42.13 | 44.18 | NS | 1.58 |
| Gain from start to 3 weeks after mating (kg) | 5.25 | 4.52 | 5.84 | NS | 0.69 |
| Dry matter intake (g)* | 1056 | 1260 | 1451 | | |

* = Ewes fed on a group basis; therefore no statistical analysis was carried out.

Table (5) Effect of feeding experimental diets on ewes performances (late pregnancy)

| | G1 | G2 | G3 | SIG |
|---|------------|------------|------------|-----|
| No. of ewes | 16 | 16 | 16 | |
| Ewes live-weight at start (kg) | 43.6 ± 1.3 | 44.1 ± 1.1 | 46.1 ± 1.2 | NS |
| Per-lambing ewes weight (kg) | 51.0 ± 1.6 | 48.5 ± 1.2 | 51.8 ± 1.5 | NS |
| Post lambing ewes weight (kg) | 45.1 ± 1.5 | 43.7 ± 1.1 | 45.0 ± 1.3 | NS |
| Live weight changes start-post lambing (kg) | 1.5 ± 0.5 | -0.3 ± 0.5 | -0.1 ± 0.7 | NS |
| Lambs birth weight (kg) | 3.9 ± 0.1 | 4.2 ± 0.1 | 4.3 ± 0.2 | NS |
| Lambs weight 8 weeks post-lambing (kg) | 12.4 ± 0.6 | 12.5 ± 0.5 | 12.6 ± 0.5 | NS |
| Lambs mortality (no) | - | 2 | 2 | |

Table (6) Digestion coefficients of DM, CP, CF and energy of diets 1, 2 and 3

| | G1 | G2 | G3 | S.E.D | SIG |
|---------------|-----------|-----------|-----------|--------------|------------|
| Dry matter | 0.79 | 0.66 | 0.66 | 0.070 | ** |
| Crude protein | 0.88 | 0.78 | 0.79 | 0.020 | ** |
| Crude fiber | 0.59 | 0.33 | 0.67 | 0.055 | ** |
| Energy | 0.81 | 0.69 | 0.69 | 0.029 | ** |

** Significant at the level ($P < 0.01$)

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