# SOME WOOL CHARACTERISTICS OF OSSIMI AND RAHMANI EWES DURING DIFFERENT STAGES OF BOTH PREGNANCY AND LACTATION

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# بعض صفات صوف النعاج الأوسيمى والرحمانى خلال مراحل مختلفة من الحمل والرضاعة

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## ملخص البحث

تم دراسة التغيرات التى تحدث فى وزن الصوف النظيف من وحدة المساحة، قطر الألياف ، النسبة المئوية للألياف النخاعية للنعاج الأوسيمى والرحمانى خلال مراحل مختلفة من الحمل والرضاعة وكذلك تلك فى صوف النعاج الأوسيمى والرحمانى لمجموعة المقارنة . تم عمل القياسات على الصوف المجزوز من مساحة مربعة مخططة ( ١٠٠ سم٢ ) على منتصف الجانب الأيمن لكل نعجة على فترات شهرية : شهر قبل التلقيح ، لكل شهر من أشهر الحمل الخمسة ، لكل شهر بعد الولادة ولمدة ٣ أشهر تمثل فترة الرضاعة . وقد تمت مقارنة النتائج بمجموعة المقارنة التى من نفس العمر وعلى نفس المراحل المذكورة .

وقد أظهرت النتائج أن وزن الصوف النظيف من وحدة مساحة جلد النعاج الأوسيمى والرحمانى كان أقل معنويا من نظيره فى مجموعة المقارنة فقط خلال الشهر الخامس من الحمل . بينما خلال فترة الرضاعة كانت الفروق معنوية فقط خلال الشهر الأول . وقد نقص معنويا كل من قطر الألياف والنسبة المئوية للألياف النخاعية وذلك فى صوف الأغنام الأوسيمى فقط خلال الشهر الخامس من الحمل وخلال الشهر الأول من الرضاعة مقارنة بنعاج مجموعة المقارنة . وقد أظهرت النعاج الرحمانى نقصا معنويا فى قطر ألياف صوفها خلال الشهر الرابع والشهر الخامس من الحمل ـ أيضا خلال الشهر الأول والشهر الثانى من الرضاعة . وقد قلت النسبة المئوية للألياف النخاعية فى صوف الأغنام الرحمانى فقط خلال الشهر الخامس من الحمل وخلال الشهر الأول والشهر الثانى من الرضاعة .

ABSTRACT

Changes in clean wool weight per unit area, fiber diameter and percentage of medullated fibers of Ossimi and Rahmani ewes during the different stages of both pregnancy and lactation as well as that of the control Ossimi and Rahmani ewes were determined. Measurements were made on wool clipped from a delineated square area (100 $cm^2$) on the right mid-side of each ewe at monthly stages for one month prior to mating, for each of the five months of pregnancy and for each of three months after lambing which represented the lactation period. The results were compared to control group of each breed, of the same age and over the same mentioned stages.

The results showed that clean wool weight per unit skin area of pregnant Ossimi ($P < 0.01$) and Rahmani ($P < 0.05$) ewes were significantly less than that of the control ewes only during the 5th month of pregnancy. During lactation, significant ($P < 0.01$) differences were detected only during the 1st month. Wool fiber diameter and percentage of medullated fibers of Ossimi ewes were significantly ($P < 0.01$) reduced only during the 5th month of pregnancy and the 1st month of lactation compared to the control ewes. Rahmani ewes had significantly less wool fiber diameter than the control ewes during the 4th ($P$ 0.05) and 5th ($P < 0.01$) months of pregnancy and through the 1st month ($P < 0.01$) and 2nd month ($P < 0.05$) of lactation. Percentage of medullated fibers in wool of Rahmani ewes was significantly reduced only during the 5th month ($P < 0.01$) of pregnancy and the 1st ($P < 0.01$) and 2nd ($P < 0.05$) months of lactation.

## INTRODUCTION

The wool of local breeds is of great importance for carpet manufacture. Depression in wool production due to physiological status of the ewe has been widely reported (Doney, 1964; Yeates et al., 1975 and Reis, 1982). Wool production of pregnant and lactating local ewes was studied in relation to nutritional level (Darwish et al., 1982 and Shehata et al., 1985).

The degree of depression in wool production, however , depends to a large extent on the physiological stage at which it occurs. The present experiment was, therefore, carried out to study the change in clean wool weight per unit skin area of the ewe, fiber diameter and percentage of medullated fibers at monthly stages for one month prior to mating, during each of the 5 months of pregnancy and through each of 3 months after lambing which represent the lactation period. The collecting data may be benefitial for management practice.

## MATERIALS AND METHODS

This experiment was carried out at the Animal Production Experimental Farm, Faculty of Agriculture, Minufiya University, Shebin El-Kom, Egypt. Ossimi and Rahmani ewes of about 2.5 years old were used to investigate the change in some wool characteristics during the different stages of both pregnancy and lactation. The ewes were mated in November, 1985 and lambed in April, 1986. The measurement of wool growth was carried out by the mid-side patch technique and tacking into consideration Butler's method (1983) with some modification. One month prior to mating, wool was clipped from the right mid-side of each ewe and a semi-rigid sheet of exactly 10 x 10 cm was layed on the clipped area, centered over the last rib and midway along the dorso-ventral curvature and marking the outlines of the semi-rigid sheet with a permanent marking pen. Thus an area of exactly 100 $cm^2$ of the skin of each ewe was delineated. Wool was clipped after one month (at mating) from within the previously clipped and delineated areas with help of the semi-rigid sheet, representing wool growth during the pre-mating month. The subsequent wool clippings from within these areas were carried out at regular monthly intervals, applying also the semi-rigid sheet. Wool from within these areas was clipped to the skin level with more care, to

ensure that all wools was removed.

The experiment involved the wool growth during Nine-month periods; one month before mating, of each of the five months of pregnancy and of each of three months after lambing which represent the lactation period. The wool collected at the end of each month represented the preceding wool growth period. The tested groups were Five Ossimi and Five Rahmani ewes which were mated at the same time and succeeded to lamb within two days from the expected lambing date and continued to suckle their lambs until weaning at the end of the experiment. Each ewe was carried and reared single lamb. Five Ossimi and Four Rahmani ewes, of the same age to tested groups, that not mated, were considered as control groups during the different experimental stages. Wool growth per unit area of the skin of control ewes was estimated followed the same technique and during the same nine-month periods corresponded to that of the tested group. Wool was scoured according to Ryder and Stephenson (1968) and the clean wool weight per unit area was estimated. Fiber diameter was determined microscopically according to Nicolaev (1962) from subsamples of clean wool. The number of medullated fibers was recorded while examining the fiber diameter. The tested and control ewes were fed the same available diet. From December to May they were fed Egyptian clover, concentrate mixture and wheat straw, while during the rest period were fed clover hay, concentrate mixture and wheat straw. No supplementary feed was offered to ewes due to either pregnancy or lactation. The tested and control groups were kept in a similar environment on adequate plane of nutrition. Water and mineral mixture blocks were available for all tested and control ewes all times. All ewes of tested and control groups were treated for internal and external parasites prior to experimentation. The comparison of tested and control groups was carried out within each breed and for every stage by "t test" according to Snedecor and Cochran (1979).

## RESULTS AND DISCUSSION

The initial averages of wool growth rate per unit skin area, fiber diameter and percentage of medullated fibers for Ossimi and Rahmani ewes are shown in Table (1). There was no significant difference, within each breed, between the pre-mating ewes and the control ones.

The change in wool growth rate per unit skin area during the different stages of pregnancy is shown in Table (2). There were no significant differences between the pregnant and control ewes during the first 4 months of pregnancy for both Ossimi and Rahmani breeds. The pregnant Ossimi ($P < 0.01$) and Rahmani ($P < 0.05$) ewes were significantly produced 42.97% and 38.78% less clean wool weight per unit skin area than the control Ossimi and Rahmani ewes respectively, during the 5th month of pregnancy. The average values of clean wool weight per unit skin area were extremely reduced during the 1st month of lactation (Table 3) and therefore the pronounced and significant difference ($P < 0.01$) in clean wool weight per unit skin area between lactating and control ewes was detected during this period. The depression were 59.52% and 60.29% for Ossimi and Rahmani ewes respectively, compared to each of their control during the 1st month of lactation. It could be concluded that lactation has a high priority for the feed energy of the ewe, so that wool growth suffers much particularly during the 1st month of lactation which seems to coincide with the period of maximum milk yield of local ewes. Reduction in wool growth rate during late pregnancy and early lactation has been reported (Reis, 1982). Although lactation, in general, has greater effect than pregnancy on depression of wool production (Story and Ross, 1960; Doney, 1964 and Darwish et al., 1982); with early lactation has much greater effect than late pregnancy (Hawker and Kennedy, 1978); Coop (1953) suggested that the reduction is of

Table (1): Initial wool characteristics of Ossimi and Rahmani ewes. Mean ± SE

| Item | Pre-mating | Control |
|---|---|---|
| **Ossimi ewes:** | | |
| Clean wool weight/100 $cm^2$ of the skin (g) | 1.7238 ± 0.1563 | 1.6792 ± 0.1283 |
| Fiber diameter (micron) | 34.08 ± 1.33 | 34.21 ± 1.30 |
| Medullated fibers % | 4.15 ± 0.61 | 4.22 ± 0.93 |
| **Rahmani ewes:** | | |
| Clean wool weight/100 $cm^2$ of the skin (g) | 1.5275 ± 0.2935 | 1.4552 ± 0.2098 |
| Fiber diameter (micron) | 32.49 ± 1.74 | 32.32 ± 1.05 |
| Medullated fibers % | 4.03 ± 0.39 | 3.87 ± 0.39 |

Table (2): Wool characteristics of Ossimi and Rahmani ewes at different stages of pregnancy. Mean ± SE

| Item | Stage of pregnancy (month) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | | 5 | |
| | Pregnant | Control | Pregnant | Control | Pregnant | Control | Pregnant | Control | Pregnant | Control |
| Ossimi ewes: | | | | | | | | | | |
| Clean wool weight/100 cm² of the skin (g) | 1.7268 ± 0.1229 | 1.8372 ± 0.0815 | 2.0081 ± 0.1145 | 2.0128 ± 0.0861 | 1.4450 ± 0.1438 | 1.5980 ± 0.1250 | 1.2849 ± 0.3063 | 1.4173 ± 0.1031 | 1.1604$^{B}$ ± 0.1845 | 2.0346$^{A}$ ± 0.1413 |
| Fiber diameter (micron) | 35.07 ± 2.19 | 35.45 ± 2.59 | 37.87 ± 1.62 | 37.96 ± 1.58 | 35.39 ± 1.11 | 35.27 ± 1.24 | 33.47 ± 1.30 | 35.10 ± 1.37 | 32.61$^{B}$ ± 0.94 | 39.19$^{A}$ ± 1.04 |
| Medullated fibers % | 5.65 ± 0.60 | 5.85 ± 0.48 | 6.78 ± 0.63 | 7.94 ± 0.64 | 5.76 ± 0.73 | 5.82 ± 0.85 | 4.27 ± 0.81 | 5.50 ± 0.81 | 2.76$^{B}$ ± 0.38 | 8.08$^{A}$ ± 1.09 |
| Rahmani ewes: | | | | | | | | | | |
| Clean wool weight/100 cm² of the skin (g) | 1.5661 ± 0.2824 | 1.8152 ± 0.1475 | 1.6816 ± 0.2640 | 1.9239 ± 0.0716 | 1.3128 ± 0.1576 | 1.6881 ± 0.2052 | 1.1767 ± 0.1458 | 1.5115 ± 0.1236 | 0.9782$^{b}$ ± 0.1169 | 1.5978$^{a}$ ± 0.2207 |
| Fiber diameter (micron) | 33.99 ± 1.75 | 34.80 ± 1.06 | 34.25 ± 2.13 | 35.13 ± 1.51 | 31.42 ± 1.85 | 32.60 ± 0.86 | 28.62$^{b}$ ± 1.07 | 32.37$^{a}$ ± 0.50 | 24.38$^{B}$ ± 1.76 | 32.93$^{A}$ ± 0.37 |
| Medullated fibers % | 4.79 ± 0.53 | 5.51 ± 0.74 | 6.85 ± 0.53 | 7.58 ± 0.86 | 3.39 ± 0.40 | 3.96 ± 0.64 | 2.07 ± 0.48 | 3.84 ± 0.76 | 1.24$^{B}$ ± 0.19 | 4.12$^{A}$ ± 0.48 |

A,B Values not sharing the same superscript within each row are significantly different at level of 0.01

a,b Values not sharing the same superscript within each row are significantly different at level of 0.05

**Table (3):** Wool characteristics of Ossimi and Rahmani ewes during the different stages of lactation. Mean ± SE

| Item | Stage of lactation (month) | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Lcatating | Control | Lactating | Control | Lactating | Control |
| Ossimi ewes: | | | | | | |
| Clean wool weight/100 cm² of the skin (g) | 0.7292 ± 0.1204$^{B}$ | 1.8016 ± 0.1790$^{A}$ | 1.2156 ± 0.2151 | 1.6955 ± 0.1062 | 1.2937 ± 0.1597 | 1.3006 ± 0.1085 |
| Fiber diameter (micron) | 27.11 ± 1.07$^{B}$ | 40.16 ± 0.91$^{A}$ | 32.17 ± 0.48 | 34.33 ± 1.86 | 32.76 ± 0.99 | 33.24 ± 1.18 |
| Medullated fibers % | 1.13 ± 0.34$^{B}$ | 8.04 ± 1.04$^{A}$ | 3.35 ± 0.50 | 4.19 ± 0.42 | 3.41 ± 0.47 | 3.47 ± 0.29 |
| Rahmani ewes: | | | | | | |
| Clean wool weight/100 cm² of the skin (g) | 0.5743 ± 0.0856$^{B}$ | 1.4464 ± 0.1678$^{A}$ | 1.1558 ± 0.1617 | 1.2075 ± 0.0949 | 1.3100 ± 0.2038 | 1.1529 ± 0.1403 |
| Fiber diameter (micron) | 22.28 ± 0.87$^{B}$ | 31.87 ± 0.69$^{A}$ | 26.87 ± 0.85$^{b}$ | 29.49 ± 0.39$^{a}$ | 28.52 ± 0.65 | 30.13 ± 0.29 |
| Medullated fibers % | 0.90 ± 0.13$^{B}$ | 4.08 ± 0.46$^{A}$ | 1.25 ± 0.097$^{b}$ | 2.18 ± 0.34$^{a}$ | 1.77 ± 0.25 | 2.33 ± 0.21 |

$^{A,B}$ values not sharing the same superscript within each row are significantly different at level of 0.01

$^{a,b}$ values not sharing the same superscript within each row are significantly different at level of 0.05

the same order in both periods. Oddy (1985) found that wool growth rate of Merino ewes was affected significantly during the 4th and 5th months of pregnancy and during the different stages of lactation which of three months. This is not surprising since the largest depression in wool growth due to the physiological status could be expected in those ewes which produce the great amounts of wool while non-pregnant and non-lactating. This is the case in Merino sheep which much highly developed for wool production than the local Ossimi and Rahmani breeds under the present work.

The change in wool fiber diameter during the different stages of both pregnancy and lactation is presented in Tables 2 and 3. Wool fiber diameter of pregnant Ossimi ewes was significantly ($P < 0.01$) reduced during only the 5th month of pregnancy and the 1st month of lactation. Wool fiber diameter of Rahmani ewes was significantly reduced from the 4th month ($P < 0.05$) through the 5th month ($P < 0.01$) of pregnancy and was also significantly reduced during the 1st month ($P < 0.01$) and the 2nd month ($P < 0.05$) of lactation. These results could reflect the sensitivity of wool fiber diameter to the physiological status of Rahmani ewes. The different response of Ossimi and Rhamani breeds with regard to wool fiber diameter to pregnancy and lactation could be attributed to the differential response of wool in the two breeds to differences in nutrient requirements for pregnancy and lactation. In different strains of Merino ewes (Williams, 1979 and Oddy and Annison, 1979), the effects of pregnancy and lactation can be quite different.

The response of wool fiber diameter to the physiological status of the ewe is of great importance, since the significant reduction in fiber diameter occure in late pregnancy and early lactation may cause the "wool tenderness" which in turn may lead to a break in the staple. The disadvantage of this is that it results in increases fiber breakage during processing. Story and Ross (1960) reported that, in New Zealand, nutritional stress in late pregnancy often causes a break

before lambing, and shearing time is frequently timed to coincide with the break so that the ewes are lambed "off-shear".

Percentages of medullated fibers during the different stages of both pregnancy and lactation are presented in Tables 2 and 3. Significant differences between the pregnant and control ewes were detected ($P < 0.01$) during only the 5th month of pregnancy for both Ossimi and Rahmani ewes. During lactation, significant difference between the lactating and control Ossimi ewes was found only during the 1st month. Lactating Rahmani ewes had significantly less medullated fibers percentages than the control ewes during the 1st month ($P < 0.01$) and during the 2nd month ($P < 0.05$) of lactation. It was appeared that the reduction in fiber diameter was almost accompanied by the decrease in medullated fibers percentage. The change in fiber diameter was suggested (Galpin, 1948) to be mainly due to change in the width of the medulla, while others (Coop, 1953 and Ryder, 1956) have shown that the changes in the diameter of the fiber are accompanied by changes in the thickness of both cortex and the medulla.

It was clearly appeared from results obtained in the present work that the wool characteristics studied were significantly affected during late pregnancy and early lactation. The increase in secretion of adrenal cortical hormones associated with pregnancy and lactation may be involved in the depression of wool growth (Slee and Ryder, 1967). Oddy and Annison (1979) reported that the effects appear to relate less to changes in hormonal status than competition for nutrients within the animals tissue. They concluded that increased competition for essential nutrients, perhaps one or more amino acids, between the wool follicles on the one hand and foetal and mamary tissue on the other hand, was the most likely cause of reduced wool growth. Yeates et al. (1975) reported that when pregenancy and lactation intervene in the female, special demands for

both protein and energy are made on the animal. These must be met either by increased food intake or by mobilization of the mother's tissue reserves, and in either case wool production is likely to suffer. Corbett and Furnival (1976) suggested that wool growth depression during pregnancy may be related to lamb birth weight, and during lactation to milk production.

It may be suggested that pregnancy and lactation created nutritional demand which seems in great in late pregnancy and early lactation. This great demand could not be met at restricted feed level without utilization of body reserves, therefore a significant damage to the wool characteristics could be expected. One can attempt to minimize these effects by supplementary feeding during late pregnancy and early lactation.

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