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# CLEAN FLEECE WEIGHT COMPONENTS AND THEIR RELATION TO SOME ADAPTIVE PARAMETERS IN THE EGYPTIAN BARKI SHEEP

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## SUMMARY

To define the fleece components which contribute more to the clean wool production as well as to clear the relationship between fleece components and the adaptability of the local Barki sheep, the present study was undertaken in summer and winter. In summer, 32 ewes were allotted into two equal groups; one was exposed to solar radiation while the other was put under shade. Each group was divided again into two sub-groups; one was shorn while the other was left unshorn. On the other hand, 19 ewes were exposed to cold environment in winter and were divided into two sub-groups; shorn and unshorn. During the exposure to either heat or cold, rectal temperature, skin temperature, (ST), respiration rate, (RR), wool surface temperature (WST), and wool middle temperature (WMT), were recorded at six occasions in both seasons. At the end of the trial in both seasons, a mid-side wool sample was taken to measure staple length (STL) , fibre length, fibre diameter, clean scoured yield in addition to greasy and clean fleece weight. Moreover, fibre density, as well as the percentages of various fibre types were recorded. Heat storage indices were also calculated for eight unshorn ewes. Ewes were classified into two groups; high-and low-heat storage indices.

Most of the studied wool traits as well as RR, ST , WST and WMT were higher in summer than in winter. STL proved to be an important fleece component affecting clean wool production followed by the density of coarse and kemp fibres. If the contribution of body weight was added , these ingredients would account for 78.0% to the total variation in clean wool production . Results also indicated that denser and longer wool form a good protective integument of the animal, it acts to decrease panting and maintaining heat at the middle of the staple to preserve the animal's body temperature .

**Keywords:** Fleece components , wool temperatures ,physiological parameters , heat storage, Barki sheep.

## INTRODUCTION

Greasy or clean fleece weight was accepted as the major selection objective for both carpet and apparel wool production . While clean fleece weight and greasy fleece weight are strongly correlated , direct selection for clean fleece weight is more accurate (Turner , 1977). Greasy fleece weight consists of skin products (wax and suint), extraneous materials (dirt, vegetable matter and moisture) as well as clean wool production . The components of the latter have been defined in terms of total area of wool-bearing surface, number of fibres per unit area of skin i.e. fibre density, mean cross-sectional area of the fibres, mean fibre length and specific gravity of wool as a constant ( Turner and Young,1969). As far as the selection is concerned , it is of utmost importance to define such component which has a major contribution to increase clean wool production in Barki coarse wool breed.

The wool coat is of significant value to sheep living in desert and could readily absorb a greater proportion of the solar radiation. It assists in the maintenance of body temperature, since the heavy wool acts as a protective integument by lowering heat loss in cold environments and by decreasing heat gain in hot environments. On the other hand, shearing of sheep removes much of the insulation against both hot and cold environments (Macfarlan *et al.*, 1958). Accordingly, the present study has two folds; firstly is to determine that fleece component which contributes more to the clean wool production and secondly to find out the relationship between these wool components and some physiological parameters associated with the adaptability of the local Barki sheep.

## MATERIALS AND METHODS

The present study was conducted at the Livestock Research Farm of Al-Azhar university, Cairo. The experiment was carried out in August 1992 and was repeated in January 1993. Barki ewes available for this trial were about 1.5 years old and their body weight averaged 43.7±1.1 in both seasons . They were fed on hay and concentrates according to their body weights (Morrison , 1959) . In summer, 32 ewes were equally allotted into two groups; one was exposed to solar radiation while the other was put under shade (open pen) . Each group was divided again into two sub- groups of eight animals; one was shorn while the other was left unshorn. In winter, 19 animals were exposed to cold environment and were divided into two sub-groups; one comprised nine shorn animals while the other contained 10 unshorn animals. The shorn ewes were clipped two weeks prior to the exposure to hot or cold environments in both seasons to avoid the effect of shearing on the studied traits (Khalil, 1980). The ewes were put on treatments for a day in summer and another day in winter when rectal temperature (RT), skin temperature (ST), respiration rate (RR), wool-middle temperature (WMT) and wool-surface temperature (WST) were recorded. The foregoing parameters were measured in six occasions in both seasons; in summer , they were taken from 6 am to 9 pm at 3-hour intervals while in winter they were recorded from 2 pm to 10 am at 4-hour intervals . RT was measured by clinical thermometer while ST, WMT and WST were taken by yellow spring telethermometer (model YSI 46) using YSI 408 Banjo surface probe. RR was estimated by counting flank movements per minute . Moreover , ambient temperature (AT), relative humidity (RH), soil temperature (Ts) and black body temperature (Tbb) were recorded at 1-hour intervals during experimentation in both seasons.

Heat storage indices were calculated for eight unshorn ewes exposed to solar radiation in summer according to the following equation of Whittow (1986):

$$Sh = \Delta Tb \times tg \times P$$

where, Sh is heat storage by kj over specified time period( 9 hours from 6 a.m. to 3 p.m.); $\Delta$ Tb is a change of mean body temperature in $^{\circ}$ c; tg is a body mass in kg and P is the mean specific heat of the body mass=3.5 kj/kg/$^{o}$C. The ewes were classified equally into two sub-groups according to whether they had lower (group 1) or higher (group 2) indices as compared with the median value of heat storage (522.41 kj ) . The difference between both groups was found to be highly significant ($P<0.001$).

At the end of the experiment in both seasons, a wool sample of about 20 gms was collected from the right mid-side position of each unshorn animal , then greasy fleece weight and body weight were recorded for each animal. A small greasy sub-sample of 10 staples was taken at random from each mid-side sample and was used to measure staple length (STL) , fibre length (FL) and fibre diameter (FD) .The whole mid-side sample was used to estimate clean scoured yield (YLD) and consequently clean fleece weight was calculated for each animal in both seasons. In the greasy sub-sample , STL was the average of 10 staples , measurements were made from the base to the dense part of the tip of the staple to the nearest 0.5 cm. without applying any longitudinal tension. FL was measured from the greasy sub-sample on about 300 fibres to the nearest 5 mm. using WIRA single fibre length measuring machine as recommended by IWTO (1952) . FD was measured from the greasy sub-samples on 300 fibres using Lanameter according to IWTO (1961) . Fibre density ( D ) was recorded as the total number of fibres found in wool sample taken from one square centimeter of the right mid-side position . The whole sample was splitted on a black velvet into various fibre types i.e., fine (non medullated , F), coarse (medullated , C) and shed kemp fibres, K . Benzene test was used at times to distinguish between some fine and coarse fibres . The number of each fibre type was counted and presented as number of fine, NF, number of coarse ,NC, and number of kemp fibres, NK. (Table 1).

**Statistical analyses**

Analysis of variance was performed to partition the variability of the studied traits to its sources according to Winer (1971). For the physiological parameters (RR, RT and ST), the summer model included exposure , shearing , time of exposure and animal main effects. However , in winter model , exposure effect was excluded since all ewes were shaded. On the other hand , the analysis of WST and WMT data excluded shearing effects since these measurements were taken from the unshorn animals only in both seasons.

To point out the most important fleece component affecting clean fleece weight , the stepwise multiple regression analysis was done using proc. reg. of SAS (1988). The latter was used to form a regression equation between clean fleece weight and STL , FL, FD, D, F%, C%, K% and body weight . $R^2$ of this equation was 84.8% .

Correlation coefficients between fleece components and physiological parameters were calculated in both seasons.

Table 1. The climatic data recorded at the site of the experiment in both seasons

| | | Time | AT °C | Tbb °C | Ts °C | RH% |
|---|---|---|---|---|---|---|
| Summer | Exposed to sun | 6 AM | 23.1 | --- | 24.2 | 44.3 |
| | | 9 AM | 32.9 | 31.0 | 39.3 | 27.8 |
| | | 12 Nn | 35.4 | 41.0 | 45.6 | 21.4 |
| | | 3 PM | 34.4 | 39.0 | 42.0 | 13.1 |
| | | 6 PM | 27.3 | 33.0 | 34.6 | 27.2 |
| | | 9 PM | 22.0 | --- | 28.5 | 39.1 |
| | Shaded | 6 AM | 27.8 | --- | 29.5 | 33.9 |
| | | 9 AM | 29.6 | --- | 29.5 | 26.0 |
| | | 12 Nn | 30.0 | --- | 30.0 | 20.5 |
| | | 3 PM | 29.1 | --- | 30.0 | 22.6 |
| | | 6 PM | 25.6 | --- | 34.3 | 26.6 |
| | | 9 PM | 23.0 | --- | 29.0 | 33.6 |
| Winter | Exposed to cold | 2 PM | 22.0 | 22.0 | 17.0 | 15.0 |
| | | 6 PM | 18.0 | 17.0 | 13.0 | 35.0 |
| | | 10 PM | 10.0 | --- | 7.0 | 60.0 |
| | | 2 AM | 8.0 | --- | 13.0 | 65.0 |
| | | 6 AM | 13.0 | 15.0 | 16.0 | 60.0 |
| | | 10 AM | 20.0 | 28.0 | 20.0 | 35.0 |

## RESULTS AND DISCUSSION

Mean fibre length of unshorn ewes was estimated as 7.1 ± 0.04 cm. and 6.0 ±0.2 cm. in both summer and winter experiments respectively. The corresponding values for mean fibre diameter were 35.5±1.7μm and 32.7 ±1.3μm respectively. Significant seasonal variation was found in most studied traits where summer values were often higher than winter ones (Table 2). Variations between seasons are attributed to several factors, among them variations in atmospheric temperature and light-darkness ratio (Khalil, 1976). The winter drop in wool production may be caused partly by a decrease in the mean fibre weight made up by the decrease in both length and diameter. In Barki sheep, El-Gabbas (1993 a and b) indicated significant seasonal variations in greasy and clean wool production per unit area of skin, STL and YLD as well as D and the percentages of various fibre types.

Table 2. Least squares means ± SE of the studied wool traits in both seasons

| Season | GFW gm | CFW gm | YLD % | STL cm | FL cm | FD μm | D | NC | NF | NK |
|---|---|---|---|---|---|---|---|---|---|---|
| summer | 933.1 | 589.6 | 63.6 | 6.46 | 7.14 | 35.5 | 852.0 | 256.9 | 532.5 | 69.4 |
| | ±57.0 | ±42.2 | ±0.0 | ±0.4 | ±0.0 | ±1.7 | ±34.3 | ±24.6 | ±1.1 | ±15.6 |
| winter | 720.0 | 388.6 | 57.9 | 5.52 | 6.0 | 32.7 | 840.9 | 226.1 | 548.0 | 69.9 |
| | ±28.7 | ±53.9 | ±0.0 | ±0.5 | ±0.2 | ±1.3 | ±51.8 | ±20.8 | ±49.8 | ±18.5 |

STL was found to be an important fleece component with the major effect on clean wool production followed by number of coarse fibres/cm$^2$, body weight and number of kemp fibres/cm$^2$. Fibre diameter and fibre density revealed minor effects on clean wool production. It is worth noting that the effect of body weight on clean wool production could be associated partly with the body surface area. These results indicated that longer staples with more coarse and kemp fibres /cm$^2$ would account for 61.5% to the total variation in clean wool production. Moreover, if the contribution of body weight was added, these ingredients would represent most (78.0%) of the variations in clean wool production. In strong wool Merino, Young and Chapman (1958) found that clean fleece weight was affected largely by STL and D.

RT tended to decrease in shorn ewes under shade compared with the unshorn ones in both summer and winter (Tables 3&4) probably because of the insulative properties of the wool coat which hinders heat dissipation. Similar results were reported by Khalil (1980).

Table 3. Least squares means ± SE for the physiological parameters and wool temperatures in summer

| Expos. | shear. | Time | RT | RR | ST | WMT | WST |
|---|---|---|---|---|---|---|---|
| Expos. | Shorn | 6 AM | 38.51±0.1 | 30.25±1.8 | 31.38±0.6 | --- | --- |
| | | 9 AM | 39.35±0.1 | 72.00±5.0 | 37.88±0.7 | --- | --- |
| | | 12 Nn | 39.50±0.1 | 90.50±5.0 | 40.38±0.4 | --- | --- |
| | | 3 PM | 39.39±0.1 | 61.25±5.8 | 38.63±0.3 | --- | --- |
| | | 6 PM | 39.50±0.0 | 46.00±6.1 | 35.25±0.8 | --- | --- |
| | | 9 PM | 39.35±0.2 | 31.00±2.1 | 33.31±0.8 | --- | --- |
| | | Pooled | 39.27±0.1 | 55.17±3.7 | 36.14±0.5 | --- | --- |
| | unsho | 6 AM | 39.01±0.2 | 52.25±9.5 | 33.25±0.8 | 32.44±0.7 | 31.56±1.1 |
| | | 9 AM | 39.66±0.1 | 71.50±9.0 | 42.75±1.1 | 44.75±1.0 | 47.13±2.3 |
| | | 12 Nn | 39.61±0.1 | 89.25±6.6 | 43.13±0.7 | 45.13±1.0 | 47.25±1.8 |
| | | 3 PM | 39.71±0.1 | 77.00±4.8 | 40.38±0.4 | 41.88±0.6 | 41.50±1.1 |
| | | 6 PM | 39.65±0.2 | 57.25±7.9 | 34.75±0.5 | 34.75±0.3 | 31.63±0.5 |
| | | 9 PM | 39.20±0.1 | 32.50±2.0 | 31.31±0.9 | 31.44±0.3 | 28.75±0.5 |
| | | Pooled | 39.48±0.1 | 63.29±3.9 | 37.59±0.7 | 38.40±0.9 | 37.97±1.2 |
| Shaded | Shorn | 6 AM | 39.46±0.2 | 57.25±9.8 | 34.13±1.0 | --- | --- |
| | | 9 AM | 39.19±0.1 | 60.00±5.3 | 36.63±0.2 | --- | --- |
| | | 12 Nn | 39.14±0.1 | 49.75±4.3 | 37.38±0.4 | --- | --- |
| | | 3 PM | 39.20±0.1 | 40.00±2.8 | 36.00±0.3 | --- | --- |
| | | 6 PM | 39.74±0.2 | 35.00±2.8 | 37.50±1.0 | --- | --- |
| | | 9 PM | 39.26±0.0 | 38.00±3.6 | 36.00±0.7 | --- | --- |
| | | Pooled | 39.33±0.1 | 46.67±2.5 | 36.27±0.3 | --- | --- |
| | unsho | 6 AM | 39.76±0.2 | 79.50±9.9 | 35.69±0.3 | 34.75±0.3 | 33.63±0.2 |
| | | 9 AM | 39.34±0.1 | 53.00±4.3 | 35.38±0.9 | 34.25±0.9 | 33.38±0.8 |
| | | 12 Nn | 39.15±0.1 | 51.50±4.9 | 36.63±0.4 | 36.00±0.5 | 35.00±0.3 |
| | | 3 PM | 39.68±0.2 | 51.50±5.8 | 37.38±0.4 | 36.13±0.6 | 35.88±0.3 |
| | | 6 PM | 39.74±0.1 | 47.50±5.5 | 34.25±0.6 | 33.25±0.3 | 31.88±0.5 |
| | | 9 PM | 39.55±0.1 | 41.00±4.0 | 34.88±0.7 | 27.88±0.4 | 28.25±0.9 |
| | | Pooled | 39.54±0.1 | 54.00±3.1 | 35.70±0.3 | 33.71±0.5 | 33.00±0.4 |

Table 4. Least squares means ± SE for the physiological parameters and wool temperatures in winter

| Shear. | Time | RT | RR | ST | WMT | WST |
|---|---|---|---|---|---|---|
| Shorn | 2 PM | 40.10±0.2 | 46.22±3.3 | 35.00±0.5 | | |
| | 6 PM | 40.17±0.1 | 44.44±3.1 | 35.50±0.4 | --- | --- |
| | 10 PM | 39.52±0.1 | 32.44±1.9 | 35.22±0.4 | --- | --- |
| | 2 AM | 39.36±0.1 | 30.89±2.2 | 32.11±0.4 | --- | --- |
| | 6 AM | 39.20±0.1 | 34.67±1.5 | 33.39±0.3 | --- | --- |
| | 10 AM | 39.66±0.1 | 70.00±7.3 | 35.56±0.4 | --- | --- |
| | Pooled | 39.67±0.0 | 43.11±2.4 | 34.46±0.4 | --- | --- |
| Unshorn | 2 PM | 40.23±0.1 | 46.60±2.6 | 33.90±0.5 | 25.15±1.3 | 23.00±0.9 |
| | 6 PM | 40.24±0.1 | 41.20±1.7 | 33.80±0.7 | 22.05±1.0 | 23.10±0.6 |
| | 10 PM | 39.79±0.2 | 30.40±1.2 | 33.40±0.5 | 22.55±0.6 | 22.95±0.9 |
| | 2 AM | 39.43±0.1 | 31.00±1.5 | 32.00±0.9 | 16.10±0.4 | 25.30±0.4 |
| | 6 AM | 38.94±0.2 | 30.40±1.8 | 32.80±0.4 | 22.25±0.7 | 24.10±0.7 |
| | 10 AM | 39.71±0.1 | 44.40±2.3 | 38.10±0.2 | 33.60±1.0 | 34.20±0.9 |
| | Pooled | 39.72±0.0 | 37.33±1.2 | 34.00±0.5 | 23.62±2.3 | 25.44±1.8 |

RR was found to be generally higher in summer than in winter (54.78 vs 40.22). Ewes exposed to solar radiation in summer tended to elevate their RR as AT increased . Tables (3 & 4 ) also showed significantly that unshorn ewes had higher RR in summer and lower RR in winter compared with shorn ewes. The presence of longwool on the sheep's back in summer hindered the heat dissipation from the skin, the alternative pathway for heat dissipation was through increasing respiratory evaporation i.e., RR.

ST varied significantly between summer and winter being 2.2° C higher in summer than in winter. Ewes exposed to solar radiation in summer also showed higher ST than their shaded counterparts ( 36.9 vs 36.0 °C). Moreover, unshorn ewes exposed to solar radiation had higher ST than shorn ones , while the opposite trend was observed under shade in summer and winter (Tables 3 & 4). It appeared that ST followed closely the diurnal rhythm of the ambient temperature (AT) in both seasons. When exposed to solar radiation in summer , ST reached its maximum value at 12 noon (maximum AT) and decreased thereafter, while at exposure to cold in winter , the minimum ST was attained at 2 a.m. (minimum AT) and increased thereafter. It is well established (Khalil, 1980) that blood flow to the skin increased ( i.e. decreased total peripheral resistance by vasodilation) by increasing AT, which contributes to higher ST observed in summer. Moreover, heat dissipation through the skin in winter was at greater rate than in summer .

WST and WMT were found to be higher in ewes exposed to solar radiation in summer compared with their shaded counterparts . WST and WMT were also higher in summer than in winter (Tables 3 & 4 ) . Moreover, WST was generally higher than WMT most of the day at winter . Similar results were reported elsewhere (Macfarlane , 1968 ; Khalil , 1980) . As expected WST followed the changes in AT while WMT did not . The close contact between WST and the atmospheric condition might be an explanation . The heat seemed to accumulate at the middle of the wool staple and is preserved for a long time unless there is a high wind velocity to erupt the staple structure . These results of WST and WMT might emphasize the importance of the wool coat in preserving the animal's body temperature .

## Relationships of the Fleece Components with Ewes' Adaptability

There is significant correlations between fibre density in summer and both RT (0.53) and ST (0.55) which might indicate that dense coat might help the animal to increase its RT and ST in order to decrease the difference in temperature between the body and the atmosphere as an action towards the adaptability to the prevailing hot conditions . On the other hand , while they are not significant , the consistent negative correlations observed between STL and RR, RT and ST in both seasons might reveal that longer wool on the sheep's body act to decrease RR,RT and ST. Coarser wool was found to be associated with higher RR in winter since there was a significant correlation of 0.35 found between RR and fibre diameter. These results might indicate that denser and longer fleeces would decrease panting and provide more insulation for sheep against the prevailing conditions in both seasons . It is clear that wool acts as a protective layer to the skin at times of direct exposure to sun rays , therefore wool length is of great significance in hindering the penetration of infra-red , the heating element of the solar spectrum to the skin .

Group 1 of low heat storaged-animals tend to be consistently higher in body weight, RR, RT, ST, WST, WMT as well as F% and had lower C% as compared with group 2 of higher heat storaged-animals Table (5). This result indicates that respiratory evaporative cooling was more adequate in group 2 which regulated body temperature to a tolerable level than in group 1. It was found that evaporative water loss in Barki sheep is primarily from the respiratory tract with a very low sweat rate (Khalifa , 1979).

Table 5. Least squares means ± SE for physiological parameters and wool traits measured in the two heat storage groups of ewes

| Group | HS[1] | Bwt[2] | RT | RR | ST | WMT | WST | NC | NF |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 456.63 | 40.85 | 39.70 | 77.25 | 40.75 | 41.69 | 42.75 | 191.75 | 682.50 |
| | ±16.1 | ±1.9 | ±0.2 | ±4.8 | ±2.0 | ±2.8 | ±4.0 | ±31.5 | ±41.9 |
| 2 | 640.47 | 39.85 | 39.30 | 67.88 | 39.00 | 40.53 | 40.97 | 277.00 | 582.50 |
| | ±30.9 | ±1.8 | ±0.2 | ±12.4 | ±2.6 | ±3.2 | ±3.6 | ±25.2 | ±68.1 |

1- heat storage 2- body weight

Higher heat storaged-animals showed lighter body weights compared with lower heat storaged-animals, which might indicate that in smaller body sized-animals , the surface/volume ratio and hence, the relative surface from which heat is dissipated increases. Moreover, small animals require a greater heat production per unit of weight than large animals, if the same body temperature is to be maintained (Bianca ,1968) . Accordingly, higher heat storaged- animals appeared to be more able to conserve water by having lower respiratory rate compared with those of lower heat storaged-animals .It was also observed from table (5) that higher heat storaged- animals had more coarse fibres and less fine fibres compared to those low heat storaged-animals, that difference being significant . Perhaps coarse medullated fibres with their sparse distribution are likely to be more insulative than fine fibres, thus leading to increased heat storage into bodies of these ewes.

WST, WMT and ST of higher heat storaged animals were found to be lower than their corresponding values of the lower heat storage group. Moreover, a gradient between WST and ST was observed in both groups in which temperatures tended to decrease from wool surface to the skin. The difference between WST and ST was 2°C in both groups.

The present data revealed that longer staples with more coarse and kemp fibres/cm$^2$ are important fleece components which could be taken together with the body weight as selection criteria for heavier clean wool production. Selection for coarse fibres in Barki sheep would suit the nature of that breed as a carpet wool type. Coarse fibres and its distribution over the body seemed to be of efficient insulating properties for tolerating heat compared with fine fibres. At the same time, denser and longer wool coat acts to maintain heat at long time. It also forms a good protective integument of the animal from the penetration of heating rays and hindering heat loss by evaporation and reducing conduction and radiation from the skin to the surrounding atmosphere. In such case, increasing respiratory evaporation would be an alternative pathway for heat dissipation. That role of the fleece would also be supported by another endogenous mechanisms acting through the hormonal balance and/or vasoconstriction in order to preserve the animal's body temperature. Animals suffered from heat load in summer act to reduce their endogenous heat production by reducing the functional activity of the thyroid i.e., $T_3$ secretion rate. On the other hand, more shorn sheep exposed to cold, would increase their heat production by having higher level of $T_3$ and/or would exercise vasoconstriction of the blood flow to the skin in order to lower their heat dissipation (El-Sherbiny *et al.*,1983).

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# مكونات وزن الجزة النظيف وعلاقتها ببعض مقاييس التأقلم فى الأغنام البرقى المصريه

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١- قسم الإنتاج الحيوانى - كلية الزراعة جامعة الأزهر - مدينة نصر - القاهرة -مصر
٢- قسم إنتاج وتكنولوجيا الصوف - شعبة الإنتاج الحيوانى - مركز بحوث الصحراء - المطرية - القاهرة - مصر.

أُجريت هذه الدراسة للتعرف على مكونات وزن الجزة الأكثر تأثيرا على وزن الصوف النظيف بالأضافة الى دراسة تأثير هذه المكونات على أقلمة الأغنام البرقى فى كل من الصيف والشتاء . أستخدم عدد ٣٢ نعجة فى فصل الصيف حيث تم تقسيمهم الى تحت مجموعتين تعرضت أحداهما لأشعة الشمس بينما تم تظليل المجموعة الأخرى كما قسمت كل مجموعة الى مجموعتين تم جز أحداهما وظلت الأخرى بدون جز. وفى فصل الشتاء تم تعريض ١٩ نعجه أخرى لظروف جوية باردة وتم تقسيمها الى مجموعتين تم جز أحداهما بينما ظلت الأخرى بدون جز . وفى خلال مدة تعريض النعاج لكلا من الحرارة والبرودة تم تسجيل درجة حرارة المستقيم ودرجة حرارة الجلد ومعدل التنفس ودرجة حرارة سطح الصوف وكذلك درجة حرارة الصوف عند منتصف الخصلة وذلك على ٦ فترات فى كلا من الصيف والشتاء وفى نهاية التجربة فى كلا الموسمين تم أخذ عينات صوف من منطقة منتصف الجانب وذلك لقياس طول الخصلة وطول وقطر الليفة ونسبة الصوف النظيف بالأضافة الى تسجيل وزن الجزة الخام وتقدير وزن الجزة النظيف كما تم حساب كثافة الياف الصوف فى وحدة المساحه من الجلد بالإضافة الى تقدير نسب الأنواع المختلفة من الألياف . ومن ناحية أخرى فقد تم حساب دليل التخزين الحرارى لعدد ثمانية من النعاج وبناء على ذلك فقد تم تقسيمها الى مجموعتين إحداهما ذو دليل تخزين حرارى مرتفع والأخرى ذو دليل حرارى منخفض .

أوضحت النتائج أن معظم صفات الصوف وكذلك درجة حرارة المستقيم ودرجة حرارة الجلد ودرجة حرارة سطح الصوف بالإضافة الى درجة حرارة الصوف عند منتصف الخصلة كانت جميعها عالية فى فصل الصيف مقارنة بفصل الشتاء . أوضحت النتائج كذلك أن طول الخصلة كمكون لوزن الجزة كان هو الأكثر تأثيرا على وزن الصوف النظيف يليه فى الأهمية كثافة الألياف الخشنه وكثافة ألياف الكمب . كما أتضح أنه عند إضافة تأثير وزن الجسم الى هذه المكونات فإن هذه المكونات مجتمعه تمثل ٧٨٪ من إجمالى التباين فى وزن الصوف النظيف . وقد أوضحت النتائج كذلك أن الجزه ذات الصوف الطويل والكثيف تمثل غطاءا جيدا واق للحيوان حيث تعمل على تقليل معدل التنفس وزيادة تخزين الحرارة عند منتصف الخصلة ومن ثم تساعد الحيوان على الأحتفاظ بدرجة حرارة جسمه .