

## **EFFECT OF SOME MANAGERMENTAL ASPECTS, SEX ASSOCIATION, LIGHT, AND MELATONIN TREATMENTS ON PUBERTY OF RAHMANI EWE LAMBS**

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### **SUMMARY**

This study was carried out on 36 apparently healthy and recently weaned Rahmani ewe-lambs and two adult rams. These animals were raised at Mehallet – Mousa, Animal Production Research Station, Kafr EL – Sheikh Province, Egypt .The animals were divided into four groups (Sex associated , light and melatonin treated groups and Control one ) to investigate the effect of these managerial aspects on their puberty age and weight .The ewe lambs reared by sex associated , light and melatonin attained their puberty at an earlier age ( 6.9 , 6.1 and 5.8 months, respectively) and lower body weight ( 30, 29.22 and 28.15 Kg , respectively) than those which untreated ( 7.4 months and 32.6 Kg , respectively) . As well as, the progesterone concentrations showed significant difference between treated groups and control one.

There is no difference in behavioral signs of oestrus among different treatments but the conception rate showed variations by treatments as it decreased by treatments in compared with control group.

From this study, we concluded that the application of such managements; sex association, light and melatonin treatment pre- pubertal were beneficial to decrease the puberty age but melatonin administration has low conception rate.

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### **INTRODUCTION**

Sheep are considered as one of the most suitable species of livestock, that can survive and thrive under our difficult and complicated circumstances. But, in fact, most of ewes in the agricultural production countries are seasonal breeder and suffer from many productive problems as late puber-

ty and maturity age, low lambs crop with high lambs mortality during winter in addition to summer ram infertility (Mousa, 1996).

There are many methods to overcome these problems such as genetic engineering, cross breeding with foreign breeds and application of some managerial practices. The easier method to increase the reproductive rate in sheep is to adapt the managerial practices which take short time, not expensive, have no drawback and easily applied by farmers. The first step which is used is reducing the unproductive period in ewe's lifetime as the period from weaning until first breeding (Dickerson, 1970). The puberty was found to be affected by season of birth and climate as the ewe-lambs were reached their puberty at an average age of 6-16 months and this variation was attributed to climate and season of birth (Hafez and Scott, 1962). Also, the ewe-lambs reared in the tropics attained their puberty at an earlier age than those in temperate climates. The factors responsible may be temperature, photoperiod or other environmental influences (Zaky, 1987). As well as, the sheep reproduction is depending on light as the breeding season of sheep was determined by a change over from lengthening daylight to decrease daylight (Watson and Radford, 1955). Also, the oestrus and ovulation are not appeared in ewes which exposed to constant light or constant dark environment. (Hudson et al., 1985). When the ewe exposed to short day light, this stimulated its sexual activity but prolonged expo-

sure to short days resulted in refractoriness and subsequently cessation of reproductive activity. This refractoriness can be broken by exposing the ewe to long day light. Thus alternation between long and short days is essential for the photoperiodic control of seasonal reproduction (Forcada et al., 1997). The changes in photoperiod might regulate estrogen receptor expression within the preoptic area and suggested that hypothalamic neuropeptide Y and B-adrenergic area neurons are involved in the seasonal regulation of reproductive activity in the ewe (Skinner & Herbison, 1997), as the photoperiodic effect acting via the hypothalamic pituitary axis and mediated by way of the pineal gland (Karsh et al., 1984). So, the fertile oestrus was stimulated in ewes which subjected to artificial photoperiod involving an abrupt increase to 18-22 hours of light daily for one month followed by an abrupt reduction to 8-10 hours (Robinson, 1981).

The ram's effect on the attainment of puberty in ewe-lambs is much more limited as the sudden introduction of rams to ewe-lambs in the normal period of transition from their prepubertal to pubertal condition resulted in a high degree of synchronization of first mating (Dyrmundsson and Lees, 1972). Moreover, the introduction of ram to anoestrous ewes led to a temporary increase in LH concentration, as well as, sex association led to increase ovarian activity through means other than elevation of gonadotropins concentration. (Atkinson and Williamson, 1985).

Melatonin has a major role in sheep production, the administration of melatonin is beneficial in regulation of breeding season in sheep and in induction of oestrus out-of the breeding season; administration of it either by infusion, ingestion, injection or by constant-release devices allowed short days to be mimicked and advanced the breeding season by 4-6 weeks (Haresign, 1992). The pinealectomy and superior cervical gangliectomy led to disruption of reproductive responses to the changes in natural and artificial photoperiods (Yellon et al., 1992). Also, administration of melatonin led to improve the oestrus activity as well as, the conception rate (Mousa, 2001).

The aim of this work is to study the effect of some managerial aspects; sex association, light and melatonin administration on puberty of sheep.

## MATERIALS AND METHODS

In this study 36 recently weaned, single and October born Rahmani ewe-lambs (Each has an average age two months and an average weight 17 kg) and two adult rams (the average age and weight 4 years and 55 kg, respectively) were selected to study the effect of some managerial aspects on their sexual puberty. These animals were raised at Mehallet - Mousa, Animal Production Research Station, Kafr EL-Sheikh Province, Egypt. The animals were divided randomly into

four different groups (9 each) and treated as following:-

### I- Animals :

**Group I :** Sex associated group, in which nine ewe-lambs were reared with adult healthy fertile ram.

**Group II :** Light treated group, in which the ewe-lambs were exposed to 16 hours light daily for one month followed by an abrupt decrease to 8 hours light daily for another month (Yellon and Foster, 1994).

**Group III :** Melatonin treated group, each ewe-lamb was treated by 3 mg of melatonin (Viva-Max 3) daily per os for one month (Robinson et al., 1985).

**Group IV:** Control group, reared without any treatment under natural environment.

### II- Feeding :

Ewe-lambs were fed barseem, concentrated ration and hay in rates of 5, 0.75 and 1.5 kg / head / daily respectively, with water ad libitum.

### III- Measurements :

1- Each animal weighed and blood samples were taken weekly, serum was separated and kept at -20°C until Progesterone concentrations in serum were determined by using radio-immunoassay technique. Using Kits from Diagnostic Products Corporation (D. P.C.) Gamma Trade Geteco. Company, (Abraham, 1981).

**2- Detection of oestrus :** The oestrus was detected by introduction of an apronized ram (Fertile ram with covering its perputeal sheath by a piece of cloth to prevent it from intromission) at 7 o'clock a.m. and 5 o'clock p.m. daily from beginning of the experiment till the end of it .Ewe which stand quite and let the ram to tease and mount it called in oestrous( Amir and Volcani , 1965) .The oestrus signs were recorded . Each ewe in oestrus was served by a well examined fertile ram to detect the conception rate .

The puberty is determined by time of first oestrus onset and / or determination of serum progesterone concentrations .

#### **Statistical analysis :**

Data were collected, arranged, summarized and analyzed using the general linear model procedures of the SAS, Institute INC ( 1985 ).

Results were recorded in tables 1&2 and figure, 1.

## **RESULTS AND DISCUSSION**

The highest percent (88.8%) of ewes in oestrus obtained from ewe-lambs treated with melatonin followed by light treatment (77.7%) and lastly from sex associated ewe-lambs (66.6%) in compared with control one .The highest conception

rate recorded in ewe-lambs reared with adult ram followed by light treatment and finally melatonin administration as shown in table 1 .There is a significant difference among treated groups and control one in age of puberty and its body weight . as the ewe – lambs reared with adult ram attained their puberty at an earlier age ( 6.9 months) and lower body weight ( 30 Kg ) than those which reared separately from ram ( 7.4 months and 32.6 Kg, respectively ) ,and this substantiated with O'Riordan and Hanrahan (1989) who stated that introduction of the ram to ewe-lambs advanced the first oestrus by two weeks.

Also , the ewe – lambs which exposed to artificial light ( 16 hours light daily for one month followed by sudden abrupted to 8 hours light daily for another month ) attained their puberty at an age of 6.1 months and body weight of 29.22 Kg versus 7.4 months and 32.6 Kg , respectively for those which exposed to natural light . This coincided with Hanson and Slyter (1995) who mentioned that the breeding activity of ewe-lambs was increased by light treatment (54.8 vs. 27.9%) than in those which untreated. and disagree with Minton ( 1990 ) who suggested that reproductive and endocrine functions of sheep was stimulated by continuous exposure to short day light .

The ewe lambs treated by melatonin reached their puberty at an earlier age ( 5.8 months ) and lower body weight ( 28.15 Kg ) than untreated ones (7.4 months and 32.6 kg , respectively ) and this

agreed with Chemineau and Malpoux (1998) as the administration of melatonin by subcutaneous implant led to advance the cyclical ovulatory activity of ewes and improve the fertilization rate, but disagreed with Perez-Eguia and Hallford (1994) as the reproductive and endocrine characteristics of ewe-lambs did not significantly affected by short (30 days) or long term (60 days) of melatonin administration.

The progesterone concentrations showed significant difference between treated groups and control one as shown in table 2 and fig. (1) this significant begins to appear at the age of 5 months. This variation in progesterone concentrations confirm the appearance of oestrus at this age. The oestrus signs are; seeking out the ram, collecting around him, tail wagging, bleating, stand quite for accepting the ram and show frequent urination, so, there is no difference in behavioral signs of oestrus among different treatments.

Our results explained that sheep are short day breeder and its activity is increased during short day light either naturally or artificially as the decrease of light leads to secretion of melatonin from pineal gland stimulating the hypothalamus producing gonadotrophin releasing hormone which stimulate the pituitary gland to secrete FSH and LH resulting in oestrus signs Alan Mowlem (1992). Also, the administration of melatonin allowed the short days to be mimicked. In addition to the presence of ram pheromone leads to increase the LH pulse frequency in ewe-lambs producing oestrus activity Al-Mauly et al. (1991). As well as, most of induced oestrus by these managements are not accompanied by ovulation so, the conception rate was low in the treated groups

From this study, we concluded that the application of some methods of management as sex association, light program and melatonin treatment prepubertal were beneficial for sheep producers.

Table (1): Effect of sex association, light and melatonin treatments on oestrus onset and conception rate in Rahmani ewe-lambs ( Mean± SE).

| Treatments<br>Variables                 | Control group<br>( 9 ewes ) | Sex associated group<br>( 9 ewes ) | Light treated<br>group<br>( 9 ewes ) | Melatonin<br>treated group<br>( 9 ewes ) |
|---|-----------------------------|------------------------------------|--------------------------------------|--|
| Age of oestrus onset<br>( month )       | 7.4 ±0.010c                 | 6.9 ±0.022a                        | 6.1 ±0.099b                          | 5.8 ±0.050b                              |
| No.of oestrus ewes                      | 6/9                         | 6/9                                | 7/9                                  | 8/9                                      |
| % of oestrus                            | 66.6                        | 66.6                               | 77.7                                 | 88.8                                     |
| Weight of ewe at oestrus<br>onset ( kg) | 32.6± 0.046d                | 30± 0.038a                         | 29.22 ±0.042b                        | 28.15± 0.030c                            |
| No . of conceived ewes                  | 4/6                         | 5/6                                | 5/7                                  | 5/8                                      |
| % of conception                         | 66.6                        | 83.3                               | 71.4                                 | 62.5                                     |

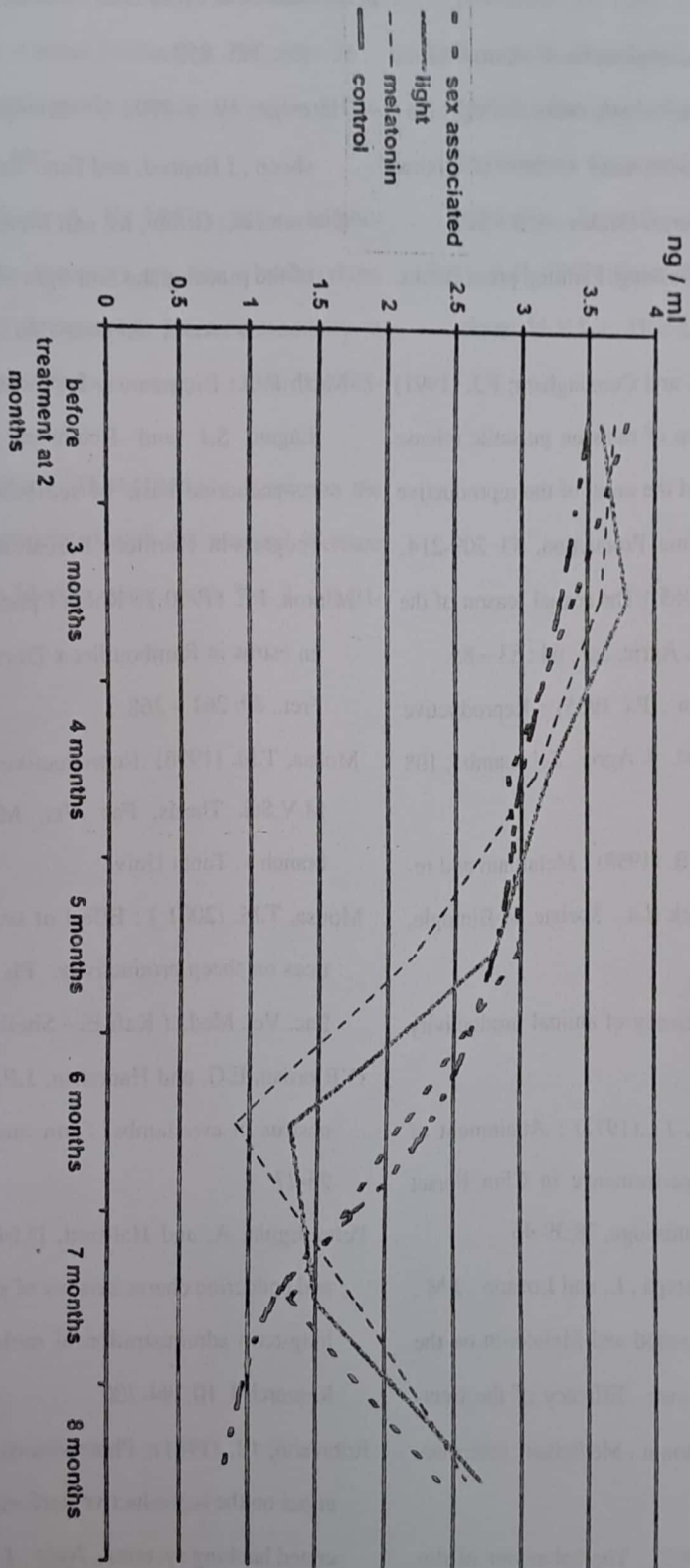
\* Mean which scripted with different small letters ( a , b , c .... ) at the same row differ significantly at ( p < 0.05 ).

Table (2): Effect of sex association, light and melatonin treatments on serum progesterone concentrations (ng/ml) in Rahmani ewe-lambs ( Mean± SE).

| Treatments<br>Variables         | Control group<br>( 9 ewes ) | Sex associated group<br>( 9 ewes ) | Light treated<br>group<br>( 9 ewes ) | Melatonin<br>treated group<br>( 9 ewes ) |
|---------------------------------|-----------------------------|------------------------------------|--------------------------------------|--|
| Before treatment at 2<br>months | 3.5 ±0.062a                 | 3.8 ± 0.005a                       | 3.6 ±0.041a                          | 3.7 ±0.023a                              |
| 3 months                        | 3.4 ±0.033a                 | 3.4 ±0.039a                        | 3.8 ±0.005a                          | 3.6 ±0.051a                              |
| 4 months                        | 3± 0.051a                   | 2.9± 0.099a                        | 3.2± 0.032a                          | 3.1± 0.047a                              |
| 5 months                        | 2.8 ±0.031a                 | 3± 0.049a                          | 2.8± 0.024a                          | 2.2 ±0.038b                              |
| 6 months                        | 2.3±0.053a                  | 2.1± 0.009a                        | 1.3± 0.045c                          | 0.9 ±0.026b                              |
| 7 months                        | 1.2± 0.056a                 | 1.3 ±0.055b                        | 1.5 ±0.068b                          | 1.7 ±0.025b                              |
| 8 months                        | 0.8± 0.019a                 | 2.4 ±0.011b                        | 2.7± 0.029b                          | 2.6 ±0.044b                              |

\* Mean which scripted with different small letters ( a , b , c .... ) at the same row differ significantly at ( p < 0.05 ).

Fig. (1): Effect of sex association, light and melatonin treatments on serum progesterone concentrations in Rahmani ewe lambs.



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