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Impact of the artificial rearing system on Awassi lambs' behaviour and growth performance – A new approach of sheep husbandry in subtropical countries

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Introduction

Mutton and sheep milk have traditionally very important role in the food supply of the Mediterranean and Middle-East countries. Awassi is a widespread fat-tailed sheep breed of these regions. A relatively new technology – intensive milk producing with artificial lamb rearing – has been introduced in Israel and imported to Hungary to increase the milk production of this breed. Artificial lamb rearing is a common keeping method in intensive milk-production systems (NAPOLITANO ET AL., 1995; MARTIN, 1999), which forces lamb separation from dams as soon as it possible. This technology based on early weaning and artificial rearing of lambs on milk replacer and it has an important impact on increasing flock productivity.

One of the main factors which have effect on the early development of lambs is the time of weaning. The first 10-12 hours post-partum is a critical, sensitive period during which suckling plays a key role for the establishment of the mother-lamb bond (ALEXANDER ET AL., 1986; NAPOLITANO ET AL., 1995; NOWAK ET AL., 1997; FISHER AND MATTHEWS, 2001). It is known that lambs permanently nursed by their dam do not accept being bottle-fed and do not socialise to humans at a young age, despite regular short sessions of human petting (BOIVIN ET AL., 2001). As expected from literature, lambs separated early from their mother, readily accepted additional human contact including drinking from a bottle or a bucket of milk (MARKOWITZ ET AL., 1998; BOIVIN ET AL., 2001).

Aim of this experiment was to investigate the effect of weaning time on behaviour and growth performance of lambs, considering to the different separation moments during the sensitive period (6-12 h postpartum).

Material and Methods

Twenty-one artificially housed Awassi lambs were selected for this trial. The experiment was conducted at the artificial lamb rearing farm of Bakonszeg Awassi Ltd. in Hungary. Animals were divided into three groups with seven animals in each group. IW (immediately weaned) lambs were separated from dams immediately after parturition. Other two groups (6H and 12H) were moved from dams 6 and 12 h after parturition and were allowed to suck their mother until that time. Growth rates (body weights, average daily gain – ADG) of the animals were investigated. Proportion of active (moving, playing, feeding) and inactive (lying, resting, standing) behavioural elements were compared in the first week after grouping. Animals were trained to accept the artificial teats by the stockpersons. All the lambs were fed with colostrums in the first two days and each group was kept in a 4m×2m straw bedded pen. Milk replacer was mixed and portioned by ALFA-LAVAL milk equipments which were cleaned and disinfected daily. Adoption time of the artificial teat was investigated in the first week after birth. Lambs

were observed individually by an observer. Events of human helping to find the teats were numbered. Groups were compared by the total number and the duration of stockperson's helping at feedings (at 7.00 am, 12.00 pm and 18.00 pm). Body weights (BW) were measured daily in the first week, than weekly for 4 weeks. Average daily gains (ADG) were calculated from the differences of weights. Data were evaluated by variance analysis (ANOVA) using linear statistical model.

Results and Discussion

Proportion of the total duration of the different behavioural elements on the three days of investigation is shown by the Figure 1. Standing and laying have the highest proportion at the three groups. Proportion of laying increased, while proportion of standing decreased during the experiment at the IW group. Playing behaviour was only appeared at the group IW and 6H (highest proportion was found at group IW). Feeding has the highest proportion at group IW, during the investigated three days.

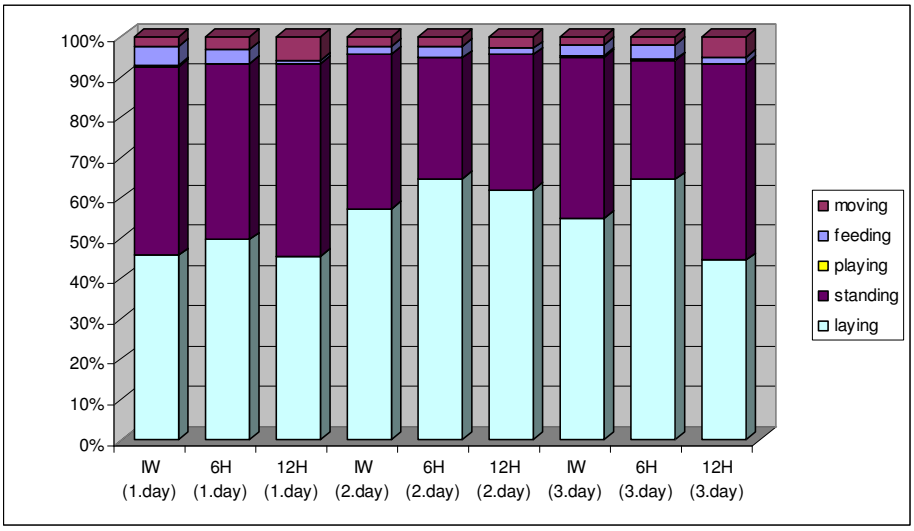

Figure 1: Proportion of the total duration of the different behavioural elements

On the first day of investigation, stockpersons had to help finding and using the artificial teats to 85% of the lambs (n_{Σ}=18; n_{IW}=4, n_{6H}=7, n_{12H}=7). This value was significantly lower (P<0.01) from the 2nd day, and it decreased to 33% for the end of the investigation (n=7) (Table 1). Duration of stockpersons' assistance at feeding was also changing on the three days. The animals needed human handling during the total feeding time on the first day (it was 0.5-1.5 min/head). From the 2nd day, it was enough to drive the lambs near to the artificial teats and they could find and use them to feed individually.

Table 1: Number of nursed lambs during the feedings (head)

Group	***n***	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**
IW	*7*	4	3	3	0	0	0	0
6H	*7*	7	5	4	4	5	4	3
12H	*7*	7	7	6	7	5	5	4

Body weights (BW) of lambs at different ages are shown in Figure 2. Significant differences were not found between birth weights of the three groups. At the end of the 1st wk, IW lambs were heavier (P<0.05) than 12H lambs. From the 2nd wk until the end of investigation, strong significance occurred between live weights of IW×12H and 6H×12H animals (P<0.05), but no differences were found at IW×6H groups during the whole experiment. From the end of the 1st

wk, lambs from 12H group had the lowest live weights (BW_{12H} at 4wk=5.35±0.31 kg; BW_{6H} at 4wk=8.04±1.73 kg; BW_{IW} at 4wk=9.98±2.57 kg).

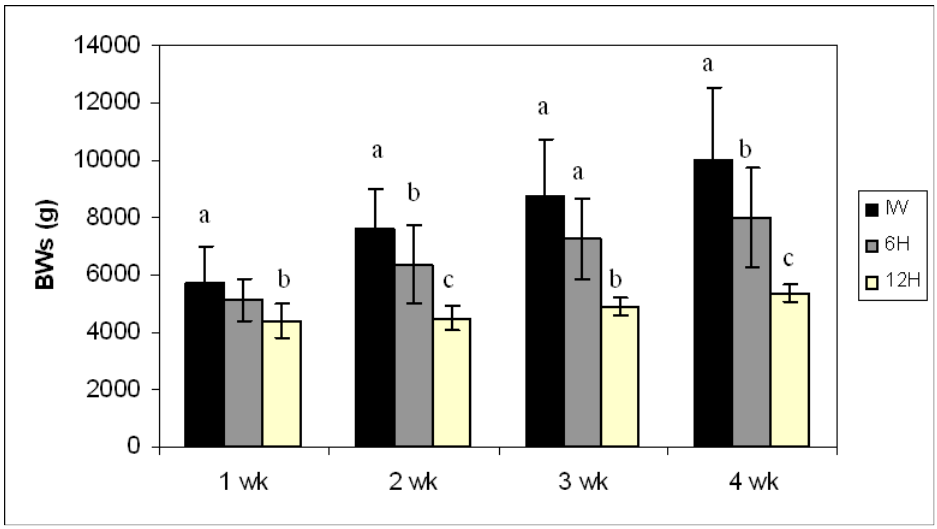

Figure 2: Body weights of lambs at different ages (IW: immediately weaned; 6H: separated 6 h post-partum; 12H: separated 12 h post-partum). Bars with different letters are significantly different (a-a: NS, non significant; a-b, a-c and b-c: P<0.05)

The same tendency evolved at average daily gains (ADGs) which are shown at Figure 3. The ADGs of IW group had not varied significantly from 6H group during the experiment. Whereas, differences between IW×12H and 6H×12H groups were very strong, from the beginning to the end of the investigation (P<0.01). Mean of AVGs of the 4 wk was the lowest at group 12H (app. 60 g/4wk), while the same value was significantly higher at the other two groups (IW: app. 230 g/4wk; 6H: app. 180 g/4wk).

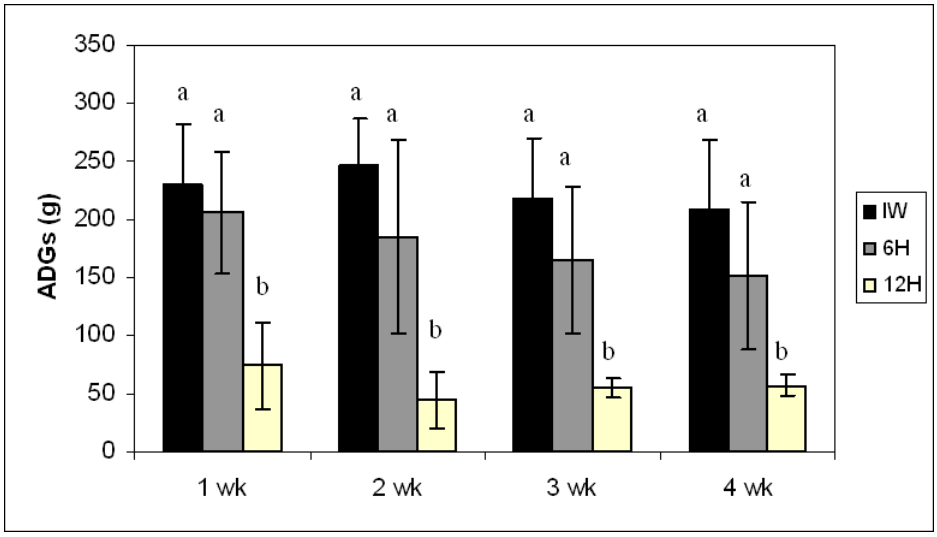

Figure 3: Changing of lambs' average daily gains (ADGs, means and standard deviations) during the investigation (IW: immediately weaned; 6H: separated 6 h post-partum; 12H: separated 12 h post-partum). Bars with different letters are significantly different (a-a: NS, non significant; a-b: P<0.01)

Conclusions and Outlook

It was found that the duration and number of inactive elements at IW lambs showed a significantly higher increasing than the other two groups. IW lambs accepted earlier the stockperson and his/her assistance during feedings. Immediate separation after parturition and direct training can help the lambs to accept the artificial nipple and accommodate to the new rearing conditions. As the results show, that was more difficult to feed those lambs which had the chance to suck for a few hours. Lambs in the IW group also accepted earlier the artificial teat of the feeding equipment (compared to other two groups) and learned to use it for the 2nd day.

Regarding to the growth rates, IW lambs showed the highest ADG during the experiment and the differences were significant compared to group 12H. The IW lambs showed significantly the highest average ADG (app. 230 g/4wk) and body weight (9.98 ± 2.57 kg) at the end of the experiment.

Comparing the BWs and ADGs of the investigated groups, one can tell that the presence of dam in the first few hours has had very strong effect on the development of the animals. IW and 6H animals showed significantly higher results both in BWs and ADGs than the 12H lambs. It means that the time of separation influences the parameters of growth performance. The critical period of weaning is between 6th and 12th hour post-partum, as it is also known from previous literature.

Based on the results, one can tell that the new technology of intensive milk production combined with artificial lamb rearing should give an opportunity to develop the mutton and milk production level of the sheep husbandry in subtropical countries, too. Of course, other factors can also influence the production level of the animals (climate, feeding systems etc.). Considering to this, more experiments are needed to compare the outputs of this technology in different countries.

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