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Comparison of Three Techniques for the Estimation of the Milk Production of Small Ruminants

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THE RATE of milk production (g /hour) of 24 does and ewes was estimated by three techniques during the period from 2 to 14 weeks after parturition. In goats, using the partial milking technique as a base, complete hand milking resulted in estimated milk yield 8% lower and yields obtained by kid-suckling were approximately 39% lower. In sheep, using the lambsuckling technique as a base, partial milking gave milk yield 7-11% lower and yields obtained by complete hand milking were 26-29% less. Although statistical analysis showed a non- significant difference between tech niques, yet it may be recommended to apply the partial milking techniques because of convenience and due to higher yields.

Estimation of milk production has an increasing biological and economical consideration in small ruminants production. In Egypt, it is customary to evaluate sheep's or goats' milk yield either by complete hand milking or by weighing the young before and after suckling. This study is aimed at comparing the efficiency in evacuating the udder of these two methods as well as a suggested third one, *i.e.* the partial milking.

Material and Methods

This experiment was carried out at the small Ruminants Experimental Farm, Cairo University. Six dams, 5-7 years old, of each of the Baladi goat, Barki, Ossimi and Rahmani sheep were available for the trial. All gave birth to singles over the period December 18 to 25, 1976. The young suckled their dams freely for a week. During the next week two estimations of milk produced by each part of the udder were performed after twelve hours period of non- suckling.

Over the following 87 days, the young were separated from their dams over night (from 3-5 p.m. to 7-9 a.m.) every three days. Milk production of each dams was estimated. Three techniques, *i.e.* the complete hand milking (C.H.M.), the lamb or kid-suckling (L.S. or K.S.), and the partial milking (P.M.) were respectively used. Thus, a number of 30 tests (10 for each technique) were performed on each dam.

In the complete hand milking technique, dams were milked in the absence of their young by well trained milkers. Milk obtained was measured to the nearest C.C. The lamb suckling technique involves weighing of the lamb before and after suckling, the difference in grams would be the milk yield. In the technique of partial milking the young was alternatively permittd to suckle only one teat of the udder while the other teat was gently handmilked estimated milk was multiplied by 2 to get the whole milk production in C.C. Care was given to allow the dam to see and nose here young during milking. For each technique themilk produced in each test was converted to a rate in gram per hour, *i.e.* estimated milk $\div$ period between milking.

Dams were pen fed on liberal amounts of Berseem (*Trifolim alexandrium*) and rice straw. A concentrate mixture (containing 13-15% protein) was also given at the rate of 2/3 kg/day/doe and 3/4 kg/day ewe. Greep feeding was practised when lambs and kids reached three weeks of age. The average body weights of the dams along the experimental period were 24.67, 25.43, 35.00 and 37.13 kg for the Baladi does, the Barki, Ossimi and Rahmani ewes respectively.

Analysis of variance and correlation coefficients were carried out as outlined by Snedecor and Cochran (1973).

Results and Discussion

Comparisons among milk production rates of the Baladi does (Table1) revealed that the (P.M.) was the most efficient technique. Milk produced by the (C.H.M.) and the (K.S.) techniques were 91.98 and 60.75%of that given by the (P.M.) technique. The obtained order of efficiency may be explained in view of the comparatively high milking ability of the Baladi does (rate/kg body weight Table 1) and the kiddoe relationship. It seems that the kid was unable to consume all his dams's milk, hence the (C.H.M.) values surpassed those of the (K.S.). At the same time, the presence of the kid at milking time apparently stimulated milk secretion. It is also clear that the milk procduction rates of the (P.M.) and the (C.H.M.) techniques exceeded those of the (K.S.) throughout the experimental period. It is also interesting to observe that the values of the (P.M.) technique exceeded those of the (C.H.M.) technique in eight tests. The latter technique gave higher estimate than the (K.S.) technique in nine tests. This makes it reasonable to assume that the order of ranking of the three techniques is generally acceptable when the period of comparison is more than nine days.

As for sheep, a consistant order of ranking took place in all breeds tested (Table 1). The highest efficiency was that of the (L.S.) technique followed in order by those of the P.M. and the C.D.M. techniques respectively. The P.M. technique gave 92.57, 88.55 and 90.27% of the values of the L.S. technique in case of Barki, Ossimi and Rahmani ewes respectively. Rates of the C.H.M. technique on the other hand, were only 74.23, 70.72 and 71.86%

respectively of the rates obtained by the L.S. techinque in Barki, Ossimi and Rahmani ewes respectively. Rates of the C.H.M. techniquue on the other hand, were only 74.23, 70.72 and 71.86% respectively of the rates obtained by the L.S. technique in Barki, Ossimi and Rahmani ewes. Such order of efficiency emphasizes the importance of the lamb as a stimulator of his dam's milk secretion. Meanwhile, it seems that lambs, unlike kids, were able to suckle all their dam's milk.

TABLE 1. Mean and standard error of milk production rate (g/hour) for 2-14 weeks after parturition for small ruminants on three milking techniques.

Breed	No. of animals	Milking technique			Rate kg body weight
		Complete milking (C.H.M.)	Lamb suckling (L.S.)	Partial (P.M)	
Baladi does	6	21.15±29.36	13.97±24.54	23.00±30.69	0.93
Barki ewes	6	8.83±8.58	11.95±13.60	10.73±10.85	0.47
Ossimi ewes	6	13.15±15.54	19.72±22.95	17.73±14.53	0.56
Rahmani ewes	6	16.59±10.78	23.03±26.81	21.25±18.86	0.62

* Rate was calculated for the most efficient milking technique

TABLE 2. Analysis of variance for the milk production rate during the first month after parturition.

Source of variance	d.f.	Mean square of test number:		
		1	2	3
Goats:				
Technique	2	3.65*	6.92**	1.28
Error	15	0.99	1.75	1.75
Sheeps:				
Breed	2	6.55	13.44**	9.65
Technique	2	24.03**	19.36**	7.52
Breed X Technique	4	0.86	0.35	2.95
Error	45	2.34	2.19	3.44

* $P < 0.05$ ** $P < 0.01$

TABLE 3. Analysis of variance for the milk production rate during the second and third month after parturition.

Source of variance	d.f.	Mean square of test number.							over-all
		4	5	6	7	8	9	10	
Goats:									
Technique	2	7.055	2.52	0.27	1.85	0.34	0.19	1.75	1.53
Error	15	1.09	2.11	1.18	0.82	0.98	1.32	1.49	0.51
Sheep:									
Breed	2	15.41**	17.59**	16.75**	11.59**	4.03	9.38**	4.39	10.16**
Technique	2	0.55	4.32	1.58	5.35**	2.79	1.20	2.89	2.94
Breed X Technique	41	1.41	1.32	0.25	0.81	0.58	0.67	0.67	0.08
Error	45	2.45	2.38	1.50	1.02	1.38	1.09	1.43	1.07

* $P < 0.05$ ** $P < 0.01$

Comparisons among the rates of subsequent tests of the three techniques applied on sheep indicated that the more efficient technique exceeded that next in efficiency in 5 to 10 tests. This may be interpreted to mean that the order of ranking of three techinques was satisfactory over most of the three months period of experimentation. Analysis of variance (Tables 2 and 3) revealed a significant difference among efficiency of the different techniques during the first stages of lactation. Such difference, however, did not reach significancy during most of the following lactation period. On this basis, ono cannot conclude one technique is better than another. All three techniques could be used for estimating breed or species differences.

A part from the mere relative efficiency of the milking techniques in sheep, it may be logic to consider the practability of each technique. The L.S. technique is a time consuming and tedious technique (Barnicoat *et al.*, 1949 and Coombe *et al.*, 1960). Moreover, measuring the gain in weight of the lamb due to suckling becomes increasingly difficult as the lamb grows. In the present work, it was observed that ewes were more reluctant while were hand milked than when they were partially milked. Other research workers (Constantinescu and Gondos, 1958) reported that milking ewes away from their lambs yielded only 60-75% of the milk and 40-50% of the butterfat which could be obtained in the presence of the lambs. Consequently it may be advisable to apply the P.M technique in milk recording in Egyptian sheep. The only limitation against the application of the P.M technique might arise from the unequality of milk yield given by each teat of the udder. In this respect, tests which were carried outb efore applying the three techniques revealed a highly significant correlation ($P<0.01$), between milk produced by each of the two parts of the udder. The correlation coefficients were 0.99, 0.90, 0.74, 0.80 in Baladi goat, Barki, Ossimi and Rahmani sheep.

These findings and observations would focus attention on the P.M. technique as an easy, and practical method for milk recording in small ruminants.

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مقارنة بين ثلاث طرق لتقدير انتاج اللبن فى المجترات الصغيرة

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استخدامت ثلاث طرق (الحلب اليدوى الكامل ، رضاعة النتاج ، الحلب الجزئى) فى تقدير انتاج اللبن (جم / ساعة) خلال الفترة من ٢ ــ ١٤ أسبوعا بعد الولادة لست حيوانات من كل من الماعز البلدى ، الأغنام الأوسيمى ، الرحمانى البرقى ، فى حالة الماعز : أعطيت طريقة الحلب الجزئى أعلى معدلات (١٠٠٪) تلتها طريقة الحلب اليدوى الكامل (٩٨ر٩١٪) ثم طريقة رضاعة النتاج (٧٥ر٦٠٪) وكانت الفروق معنوية احصائيا بين معدلات كل من طريقة الحلب الجزئى وطريقة الحلب اليدوى الكامل وبين طريقة رضاعة النتاج ٠ فى حالة الأغنام تفوقت طريقة رضاعة النتاج (١٠٠٪) فى كل الأنواع وتلتها طريقة الحلب الجزئى (٥٥ر٨٨ ــ ٥٧ر٩٢٪) ، ثم طريقة الحلب اليدوى الكامل (٧٢ر٧٠ ــ ٣٣ر٧٤٪) وكانت الفروق معنوية احصائيا بين طريقة رضاعة الحوى وطريقة الحلب اليدوى الكامل بينما لم تكن معنوية بين طريقة رضاعة الحوى وطريقة الحلب الجزئى ٠

تزكى الدراسة استخدام طريقة الحلب الجزئى فى تسجيل ناتج اللبن فى الماعز والأغنام نظرا لكفاءتها وسهولة تنفيذها ٠