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Effect of Body Condition Score on Productive Performance of Local Karadi Cows

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Abstract:

Twenty one Karadi cows raised at Bakrajo Farm, College of Agriculture, University of Sulaimani, Kurdistan Region, Iraq, over the period April 2006 – May 2007 were used in this study. Cows were naturally mated, then calved between 13th of June 2006 and 21st of January 2007. Cows were scored according to the East of Scotland College of Agriculture system (ESCA) for their body condition at two periods; sixty days before the expected calving, and at calving (1-3 days after calving). Data were analyzed using the General Linear Model (GLM) procedure system by Statistical Analysis System (SAS).

The overall means of milk yield of 8 weeks, total milk yield, peak milk yield, persistency, and lactation period were 217.76 ± 18.13 kg, 290.43 ± 34.10 kg, 35.00 ± 2.69 kg/week, 4.29 ± 0.28 week, and 89.38 ± 7.01 days, respectively. Body condition score at drying off and at calving had a significant effect on 8 weeks, total milk yield, peak milk yield and persistency. Lactation period was affected by body condition score at drying off, whereas body condition score at calving not affected the former trait. Parity and season of calving not affected the former traits.

Keywords:- Karadi cows, Sulaimani, body condition score, milk yield, parity, season of calving, peak milk yield, persistency, lactation period.

1. Introduction:

Karadi is the main native breed of cattle in Iraqi Kurdistan. They are small in size and their colours ranging from brown to black. Information concerning the performance of this breed is limited and restricted to animals kept at one state farm [1].

Dairy cattle, in common with most lactating mammals, are usually in negative energy balance in the first few weeks of lactation [2]. The energy shortfall between intake and requirements must be met through mobilization of body tissue. Body condition score (BCS) is a quick, noninvasive, inexpensive, yet somewhat subjective means of estimating fat stores in dairy cows independent of the animal's frame size and body weight [3]. There is an assessment of the proportion of body fat that it possesses, and it is recognized by animal scientists and producers as being an important factor in dairy cattle management [4]. Too little or too much body fat at calving can be associated with a reduction in subsequent milk production [5].

Earlier, body condition score at calving (BCSC) was found to be significantly affecting 305-day milk yields [6], daily milk yield of heifers and cows [7], peak yield and persistency [8].

The aims of this study were to investigate the effect of BCS on some economic characteristics in Karadi cows. Also, to perform the first step of establishing a BCS system with a scale fits the Karadi cows as a first attempt to introduce such system for Iraqi breeds.

2. Materials and Methods:

Twenty one Karadi cows raised at Bakrajo Farm, College of Agriculture, University of Sulaimani, Kurdistan Region, Iraq, were used in this experiment during the period April 2006 to May 2007.

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Cows were naturally mated, then calved between 13th, June 2006 and 21st, January 2007. Animals were checked weekly for health control by the veterinary department services, Directorate of Bakrajo Farm. Cows were fed a concentrate diet during drying off and lactation period (3 and 3.5 kg/cow/day) according to their requirement for production and maintenance [9]. Cows were given an access to pasture from early April until early June (3-4 hours/day). Wheat straw was also offered at a rate of 3-3.5 kg/cow/day. The concentrate mixture contained 17.23 % crude protein and 3328 kcal DE/kg.

Cows were scored for their body condition at two periods; sixty days before the expected calving [such scores were considered to be body condition score at drying off (BCSD)], and at calving (1-3 days after calving) according to East of Scotland College of Agriculture system [10]. Cows were milked twice daily at 7 am and 5 pm. Accumulated milk yield was calculated for the first 8 weeks and total milk yield during the entire lactation to the nearest 0.1 kg.

Peak yield was calculated as the highest weekly milk yield throughout the lactation. Persistency was obtained as the number of weeks in which milk yield was maintained at a high level, (not lower than 80% of peak milk yield) [11].

Cows were classified into 2 groups according to parity; the first one includes cows in their first and second lactations. The second group includes cows at their third and fourth lactations. The data were again classified into 2 calving groups according to calving season. Those calved during June–September, 2006 were pooled in the first group, whereas those calved between October 2006 and January 2007 were pooled in the second group.

Data were analyzed using the General Linear Model procedure system (SAS) [12], assuming the following model:

$$y_{ijk} = \mu + S_i + P_j + bx + e_{ijk}$$

Where:

y_{ijk} = is the value of the k^{th} observation

μ = is the overall mean

S_i = season of calving effect (i = 1 & 2)

P_j = parity effect (j = 1 & 2)

bx = the partial regression on BCSD or BCSC

e_{ijk} = random error assumed to be N ~ (0, $\sigma^2 e$)

BCSD and BCSC were used separately to avoid multicollinearity science the correlation coefficient between them was found to be 0.81 ($P<0.01$).

3. Results and Discussion:

Results obtained from the two separates analysis are shown in tables (1) and (2). It is obvious that the values of R^2 were higher when BCSD was used. Therefore results for parity and season of calving from table (1) were used in the discussion.

3.1. Milk Yield of 8 weeks:

The overall mean for milk yield of 8 weeks was 217.76 ± 18.13 kg (Table 1). The effects of BCSD and BCSC on this trait were significant ($P<0.01$) (Tables 1, 2). Significant effect of BCSC on milk yield during the early stage of lactation (from second to the ninth week of lactation) was also reported [13].

Result also reveals no significant effects of season of calving and parity on milk yield of 8 weeks (Table 1). Similar no significant seasonal effect on milk yield of 8 weeks was reported [14] for Jenubi cows. A non significant parity effect was also reported for crossbred cows [15].

3.2. Total Milk Yield:

In the present study, the overall mean of total milk yield was 290.43 ± 34.10 kg (Table 1). Earlier an average milk yield of 159.14 kg for Karadi cows was reported [1].

The effects of BCSD and BCSC on total milk yield were significant (Tables 1, 2). It appears from Figures (1) and (2) that body condition score of 3-3.5 at drying off and at calving resulted in a highest total milk yield.

Although lactation period were short (89.38 ± 7.01 days) and cows had an adequate time to regain condition till scoring sixty days before calving, the significant effect of BCSD indicate the presence of an effective variability among cows in their body condition (Fig. 1). A significant relationship between body condition score at calving and 305-day milk yields was also reported [3].

Results showed that total milk yield was not affected by parity and season of calving (Table 1). Also, no significant effect of parity was reported [16] for Sharabi cows. Earlier, results for Jenubi cows revealed a non significant effect of season of calving on total milk yield [17].

3.3. Peak Milk Yield:

The overall mean for the peak milk yield was 35.00 ± 2.69 kg/week (Table 1). The effects of BCSD and BCSC on peak milk yield were significant ($P<0.01$) (Tables 1, 2). Such significant effects does agree with what was found earlier [8], whom found that cows in poor condition at calving gave low peak milk yields, and those in a good condition at calving gave the highest peak milk yields.

Also, result showed that peak milk yield was not significantly affected by parity (Table 1). Such not significant effect is in agreement with other [18]. Table (1) reveals no significant effect of season of calving on peak milk yield. Such results disagree with those reported earlier [19] where peak yield was affected by season of calving.

3.4. Persistency:

The overall mean for the persistency was 4.29 ± 0.28 week (Table 1). The effects of BCSD and BCSC on persistency were significant (Tables 1, 2). Such result agree with evidence reported earlier [8], whom found that cows in poor body condition at calving gave the highest persistency, and those in a good condition at calving gave lowest persistency.

Results showed that persistency was not affected significantly by parity (Table 1). This is similar to results reported with other [20]. The effect of season of calving on persistency was not significant (Table 1). This is in accordance with other [21].

3.5. Lactation Period:

The overall mean for the lactation period was 89.38 ± 7.01 days (Table 1). An Average lactation period of 74.34 day was reported for Karadi cows [1]. The effect of BCSD on lactation period was significant ($P<0.05$) (Table 1), but the effect of BCSC lacked significance (Table 2).

Also, the effect of parity on lactation period was not significant (Tables 1). A non significant parity effects were also reported for Sharabi cows [16] and for Jenubi cows [17].

Also, the effect of season of calving on lactation period was not significant (Table 1). Such result was similar to those reported earlier for Sharabi cows [16] and for Jenubi cows [17].

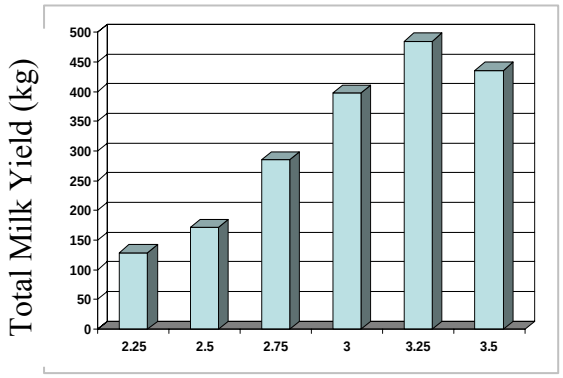
Table: 1. Means, standard error of BCSD, parity and season effects for all traits of Karadi cows.

	Eight Weeks Milk Yield (kg)		Total Milk Yield (kg)		Peak Yield (kg/week)		Persistency (week)		Lactation Period (day)	
	No.	Mean ± S.E.	No.	Mean ± S.E.	No.	Mean ± S.E.	No.	Mean±S.E.	No.	Mean ± S.E.
Overall Mean	21	217.76 ± 18.13	21	290.43 ± 34.10	21	35.00 ± 2.69	21	4.29 ± 0.28	21	89.38 ± 7.01
BCS at Drying Off	21	180.51±20.19**	21	308.61±60.19**	21	27.76±2.73**	21	1.65±0.60*	21	44.82±17.56*
Parity No.										
1 and 2	10	200.62 ± 11.39	10	279.59 ± 33.94	10	32.81 ± 1.54	10	4.55 ± 0.34	10	89.80 ± 9.90
3 and 4	11	233.80 ± 11.07	11	300.44 ± 33.02	11	37.02 ± 1.50	11	4.08 ± 0.33	11	88.55 ± 9.63
Season of Calving										
June - September	10	222.16 ± 11.56	10	291.77 ± 34.47	10	35.20 ± 1.56	10	4.64 ± 0.35	10	84.26 ± 10.06
October - January	11	212.26 ± 11.23	11	288.26 ± 33.47	11	34.63 ± 1.52	11	3.99 ± 0.34	11	94.09 ± 9.76
R^2	**0.86**		**0.65**		**0.88**		**0.46**		**0.29**	

Table: 2. Means, standard error of BCSC, parity and season effects for all traits of Karadi cows.

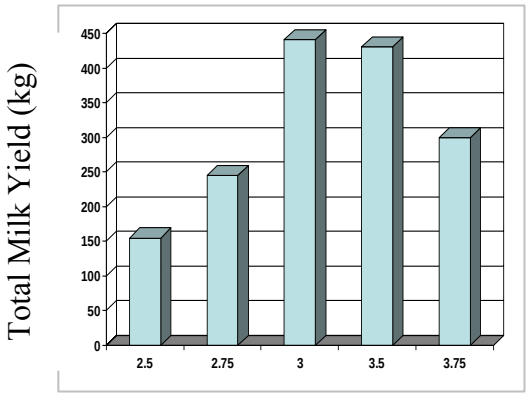
	Eight Weeks Milk Yield (kg)		Total Milk Yield (kg)		Peak Yield (kg/week)		Persistency (week)		Lactation Period (day)	
	No.	Mean ± S.E.	No.	Mean ± S.E.	No.	Mean ± S.E.	No.	Mean±S.E.	No.	Mean ±S.E.
Overall Mean	21	217.76 ± 18.13	21	290.43 ± 34.10	21	35.00 ± 2.69	21	4.29 ± 0.28	21	89.38 ± 7.01
BCS at Calving	21	149.77±40.03**	21	227.16±92.53*	21	25.57±5.28**	21	1.82 ±0.68*	21	28.40±22.11
Parity No.										
1 and 2	10	183.52 ±19.79 *	10	250.01 ± 45.74	10	30.21 ± 2.61 *	10	4.40 ± 0.34	10	85.45±10.93
3 and 4	11	250.21 ± 19.21	11	329.11 ± 44.42	11	39.49 ± 2.54	11	4.22 ± 0.33	11	92.81±10.61
Season of Calving										
June - September	10	231.47 ± 20.29	10	310.95 ± 46.90	10	36.35 ± 2.68	10	4.67 ± 0.35	10	87.56±11.20
October - January	11	202.27 ± 19.64	11	268.18 ± 45.40	11	33.35 ± 2.59	11	3.94 ± 0.33	11	90.70±10.85
R^2	**0.56**		**0.33**		**0.65**		**0.45**		**0.10**	

* Significant at $P < 0.05$. ** Significant at $P < 0.01$.



BCSD

Fig. 1: Total milk yield of Karadi cows with different BCSD.



BCSC

Fig. 2: Total milk yield of Karadi cows with different BCSC.

Table (1) reveals high values of R^2 for eight weeks and peak milk yield. This result indicates that high proportions of variability of studied traits were taken into account by the used models. Such high R^2 values may be due to the fact that eight weeks and peak milk yields occur at early lactation so BCS used in the model influenced them.

Finally, more work is needed to study BCS and its effect on Karadi cows to establish a system with a scale fits this breeds.

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کاریگەری پلەی باری جەستەیی لەسەر توانای بەرهەمی لە مانگای کوردی خۆمالّی دا

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پوختـــە

بیست و یەك مانگای کوردی بەکارهێنرا لە کێڵگەکانی بەکرەجۆ، کۆلێژی کشتوکالّ، زانکۆی سلێمانی، هەرێمی کوردستان، عێراق. لێکۆڵینەوەکە بەردەوام بوو لە ماوەی نیسانی ٢٠٠٦ تا مایسی ٢٠٠٧. مانگاکان کەڵدران بە شێوەی کەڵدانی سروشتی و پاشان زان لە ماوەی ١٣ حوزەیرانی ٢٠٠٦ تا ٢١ کانونی دووەمی ٢٠٠٧. پلەی باری جەستەیی (BCS) بۆ مانگاکان پێورا لە دوو کاتدا؛ ٦٠ ڕۆژ پێش لە دایکبوونی چاوەڕوانکراو وە لەکاتی زایین دا (١-٣ ڕۆژ دوای لە دایکبوون). پرۆگرامی کۆلێژی کشتوکالّ ڕۆژهەلاّتی ئوسکتلندا (ESCA) بەکارهێنرا بۆ پێوانەکردنی پلەی باری جەستەیی، بەرنامەی شیکردنەوەی ئامار (SAS) بەکارهێنرا بۆ شیکردنەوەی داتاکان.

تێکڕای گشتی بەرهەمی شیر لە ٨ هەفتە، بەرهەمی شیری گشتی، بەرهەمی شیر لە لوتکە، بەردەوامی و ماوەی شیردان گەیشتە ٢١٧,٧٦ ± ١٨,١٣ کغم، 34.10 ± 290.43 کغم، 2.69 ± 35.00 کغم/هەفتە، 0.28 ± 4.29 هەفتە و 7.01 ± 89.38 ڕۆژ یەك بە دوای یەك. پلەی باری جەستەیی لە کاتی ووشك بوون و زاییندا کاریگەری واتاداریان هەیە لە سەر بەرهەمی شیر لە ٨ هەفتە، بەرهەمی شیری گشتی، بەرهەمی شیر لە لوتکە و بەردەوامی دا. ماوەی شیردان کاریگەر بوو بە پلەی باری جەستەیی لە کاتی ووشك بوون دا، لەکاتێکدا پلەی باری جەستەیی لە کاتی زاییندا کاریگەری نەبوو لەسەر ئەم سیفەتە. هەروەها هەریەك لە ڕیزبەندی زایین و وەرزی زایین کاریگەریان نەبوو لەسەر سیفاتی لێکۆڵراو.

تأثير درجة حالة الجسم على الأداء الأنتاجي في الأبقار الكرادية المحلية

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الخلاصــة

تم استخدام ٢١ بقرة كرادية في حقول بكرجو التابعة لكلية الزراعة، جامعة السليمانية، اقليم كردستان العراق. أجريت التجربة خلال الفترة من نيسان ٢٠٠٦ الى مايس ٢٠٠٧. تم تسفيد الأبقار بصورة طبيعية ومن ثم ولدت في الفترة بين ١٣ حزيران ٢٠٠٦ الى ٢١ كانون الثاني ٢٠٠٧. هذا وقد أخذت قياسات حالة الجسم (BCS) للأبقار خلال فترتين" ٦٠ يوم قبل الولادة المتوقعة وعند الولادة (١-٣ يوم بعد الولادة). وقد استعمل نظام كلية الزراعة شرق اسكتلندا (ESCA) لقياس درجة حالة الجسم. هذا وتم تحليل البيانات عن طريق النموذج الخطي العام (GLM) بأستخدام برنامج التحليل الأحصائي (SAS).

بلغ المتوسط العام لأنتاج الحليب في ٨ أسبوع، انتاج الحليب الكلي، قمة الأنتاج، المثابرة و فترة الأنتاج ٢١٧,٧٦ ± ١٨,١٣ كغم، 290.43 ± 34.10 **كغم،** 35.00 ± 2.69 **كغم/أسبوع،** 4.29 ± 0.28 **أسبوع و** 89.38 ± 7.01 **يوم على التوالي. كان لحالة الجسم عند التجفيف وعند الولادة تأثير معنوي في انتاج الحليب لـ ٨ أسبوع، انتاج الحليب الكلي، قمة الأنتاج و المثابرة. فترة الأنتاج تأثر بدرجة حالة الجسم عند التجفيف، في حين لم تؤثر درجة حالة الجسم عند الولادة في هذه الصفة. كما لم يؤثر كل من تسلسل الولادة وفصل الولادة في الصفات المدروسة.**

وەرگیراوە لە ٢٠٠٩/٥/٢٨ دا , و پەسەند کرا لە ٢٠١٠/٢/١٠ دا

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