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MORTALITY AND BIRTH WEIGHT IN FRIESIAN, SHARABI AND CROSSBRED CALVES

S. A. M. Dabdoub

Department of Veterinary Public Health, College of Veterinary, Medicine, University of Mosul, Mosul, Iraq

ABSTRACT

Birth weight of 149 Friesian, 270 Sharabi and 121 crossbred calf's males and females were utilized. The mortality rates have been obtained from birth until weaning for each breed in males and females. Average birth weight in male's survival group for Sharabi, Friesian and crossbred were 20.94, 30.82 and 30.19 kg respectively, and in females were 18.42, 29.11 and 28.10 kg, respectively. Birth weight in Sharabi was significantly different ($P < 0.01$) from Friesian and crossbred in both males and females. In mortal group the birth weight was significantly ($P < 0.01$) less than survival group in both sexes and for each breed.

Mortality rate in males and females were (14.1%, 16.7%) in Friesian, (21.2%, 23.6%) in Sharabi and (8.8%, 7.5%) in crossbred respectively, which differ significantly ($P < 0.05$) among breeds. But, no significant difference between males and females was detected.

The Point–Biserial correlations between mortality and birth weight were negative and highly significant for the three breeds in males and females. The threshold point of birth weight values which gave the best efficiency, the efficiency were for Friesian (89%, 85%), Sharabi (86%, 80%) and crossbred (93%, 94%) for males and females calves respectively. The screening analysis for given threshold were sensitivity, specificity, Fm, and Fc, as well as efficiency were determined. Advantageous results were in least specificity, Fm and Fc, and in high efficiency and sensitivity.

The threshold values of birth weight for classifying mortal and survival groups were (25.6, 26.6 kg) in Friesian, (16.6, 16.1 kg) in Sharabi, and (24.6, 22.6 kg) in crossbred in male and female, respectively.

الهلاكات والوزن عند الولادة في عجول الفريزيان والشرابي والمضرب

سفيان عزيز مجيد دبدوب

فرع الصحة العامة البيطرية، كلية الطب البيطري، جامعة الموصل،

الموصل، العراق

الخلاصة

تم دراسة الوزن عند الولادة (ولادات طبيعية ومفردة)شملت (٥٤٠) عجل وعجلات، ١٤٩ فريزيان، ٢٧٠ شرابي و ١٢١ مضرب (شرابي × فريزيان). وتم حساب معدل الهلاكات للعجول عند الولادة حتى الفطام للجنسين وللسلالات الثلاثة. معدل الوزن عند الولاده في الذكور للمجموعة التي بقت على قيد الحياة للشرابي والفريزيان والمضرب كان ٢٠.٩٤ ، ٣٠.٨٢، ٣٠.١٩ كغم على التوالي. وللاناث كان ١٨.٤٢، ٢٩.١١، ٢٨.١٠ كغم على التوالي. أختلف الوزن عند الولادة في الشرابي بمعنوية عالية عن كل من الفريزيان والمضرب وفي الذكور والإناث. في المجموعة التي هلكت كان الوزن عند الولاده أوطاء من المجموعة التي بقت على قيد الحياة بدرجة معنوية عالية ولكل جنس وسلالة.

نسبة الهلاكات في الذكور والإناث كانت (١٤.١% ، ١٦.٧ %) في الفريزيان، (٢١.٢% ، ٢٣.٦ %) في الشرابي، (٨.٨ %، ٧.٥ %) في المضرب على التوالي. وكان الاختلاف معنوياً بين السلالات، بينما كانت الاختلافات غير معنوية بين الجنسين.

تبين أن معامل الإرتباط لثنائي التسلسل بين الهلاكات والوزن عند الولادة جميعها كانت سالبة وذات معنوية عالية للسلالات الثلاثة وللجنسين. الحد الفاصل للوزن عند الولاده لتصنيف المجموعة الباقية على قيد الحياة والمجموعة الهالكة أعطت أعلى كفاءه تصنيف الغربلة، كانت الكفاءه ٨٩ % و ٨٥ % في الفريزيان، و٨٦ % و٨٠ % في الشرابي, و ٩٣%, و٩٤% في المضرب و لكلا الجنسين, و على التوالي للذكوراً والإناث. أجريت تحليلات الغربلة عند الحد الفاصل المحدد وتم تقدير المعايير التالية: sensitivity، specificity، Fm، Fc إضافة إلى تقدير الكفاءه efficiency. أهم إستنتاج هو الحصول على أقل قيم للمعايير specificity ، Fm، Fc و اعلى قيم للمعايير sensitivity،efficiency.

كانت قيم الحد الفاصل للوزن عند الولادة لتصنيف المجموعة إلى: باقية على قيد الحياة و المجموعة الهالكة هي ٢٥.٦ ، ٢٦.٦ كغم في الفريزيان و ١٦.٦ ، ١٦.١ كغم في الشرابي و ٢٤.٦، ٢٢.٦ كغم في المضرب , للذكور والإناث, وعلى التوالي.

INTRODUCTION

Genetic improvement of health traits have gained major importance in livestock breeding. The epidemiological approach provides an efficient tool to achieve genetic progress.

Generally conceded that postnatal calf mortality losses are higher in some breeds, especially among breeds of dairy cattle than those in other breeds (1, 2, and 3). Calves mortality causes wide loss in economy of animal production as well as losses of genetic improvement of animals (2, 4, and 5). Likewise, the calves birth weight and mortality rate differ between different breeds (6, 7, 8). The birth weight indicate the future situation of calf such as growth rate, body weight at weaning in addition to health condition of calf and if will be mortal before weaning or will stay alive (7,9,10,11).

The aim of this work was conducted to study the differences between calf's birth weight and mortality rate from birth up to weaning in Friesian, Sharabi (native) and crossbred (Friesian × Sharabi). As well as using the birth weight as a threshold point for screening test to classify survival and mortal groups. These screening techniques are used widely in hygiene studies and epidemiology, to give special medical care and management for calves which are classified in mortal group in order to decrease the mortality rate (12, 13).

MATERIALS AND METHODS

Data on birth weight of 540 calves born between 1978–2002 at the Al–Rashidia Animal Farm in Mosul city (north Iraq) were utilized. Consist of 149 Friesian calves (71 male, 78 female), 270 Sharabi calves (113 male, 157 female), and 121 crossbred calves [Friesian × Sharabi for F1 and F2 (68 male, 53 female)]. Only data of normal single birth calves were used in the analysis and calves born abnormal were discarded. The number of mortal calves has been counted from birth until weaning for each breed and sex, and assigned "1" value to calf died and "o" value to calf survived.

Least squares method was performed to test the difference of birth weight between the breeds in survival and mortal group. The mortality rate estimated for the three breeds in both sexes, and the significant difference between them were done as delineated by Steel and Torrie (14) and Gordis (15).

The Point–Biserial Correlation calculated between mortality rate and birth weight. The significant of these correlation coefficients was tested as described by Bruning and Kintz (16).

The screening test was used to find the best threshold point of calf birth weight to classify survival and mortal groups for each breed and sex. In applying the screening technique there are terms have to be estimated for given threshold, which are sensitivity, specificity, false mortal group (Fm), and false total classification (Fc). The best thresholds were determined which gave the best efficiency (13, 15).

RESULTS AND DISCUSSION

The average birth weight for Friesian, Sharabi, and crossbred calves detailed in Table (1). The least birth weight in survival group was in Sharabi in both sexes (20.94 kg male, 18.42 kg female) and significantly different from Friesian and crossbred in male and female ($P<0.01$). Whereas, the maximum average birth weight was found in Friesian calves in both sexes, but there was no significant difference when compared with crossbred.

In the three breeds the males maintained the greatest average birth weight than females significantly ($P<0.05$). Sharabi breed is similar to subtropical breeds, which

are different in genetic makeup than Friesian breed which represent as in calve birth weight (1, 7, 8, 17).

In mortal group the average calves birth weight were least in Sharabi in both sexes which were significantly different from Friesian and crossbred ($P<0.01$). On the other hand, there were no significant differences between Friesian and crossbred in both sexes (Table 2). In comparison between calves birth weight in survival and mortal groups for the three breeds in both sexes the differences were highly significant ($P<0.01$), and the mortal group maintained the least birth weight. Which averaged for Friesian, Sharabi and crossbred in males and females (24.7, 25.2 kg), (16.3, 16.0 kg) and (23, 7, 21.8 kg) respectively. These results revealed that calve with birth weight less than the average of its breed and sex is more likely to be mortal from birth until weaning (7, 12, and 18).

Mortality rates were significantly different ($P<0.05$) among Friesian, Sharabi and crossbred. Which were 15.44, 22.59, and 8.26% respectively, when it considered overall sex? While, mortality rate in the three breeds in both sexes were presented in Table (3). The maximum mortality rate was for Sharabi which significantly differ than crossbred in both sexes. Crossbred maintained the least mortality rate, whereas, Friesian obtained the intermediate which was not significantly different from Sharabi and crossbred in both sexes. Furthermore, there was no significant difference in mortality rate between males and females in different breeds (Table 3). Crossbred maintained the best calves birth weight and mortality rate due to their genetic makeup (1, 3, and 17). These findings indicate that in order to improve the traits of the local breed is by crossing it with pure breed Friesian to get the crossbred maintaining good genetic makeup for production traits as well as good adaptation to local environment (6, 7, 8, and 17).

The Point–Biserial correlation between mortality rate and birth weight presented in Table (4). All correlation coefficients were negative and highly significant. Which is important indication to the fact that when calves birth weight is less than certain weight, it is more likely to have the risk for mortality (7, 10, 11, 12, and 18)? Therefore, the threshold point of birth weight values which gave the best efficiency in screening test was represented in Table (5) for different breeds and sexes.

For a given threshold values of birth weight, the efficiency were for Friesian (0.89, 0.85), Sharabi (0.86, 0.80) and crossbred (0.93, 0.94) for males and females respectively. The other screening analysis for given threshold are sensitivity, specificity, false classification for mortal group (Fm), and false classification of calves (Fc) were shown in Table (5). High sensitivity indicate the correctly classified the calves which were in risk to die; therefore, sensitivity as well as efficiency need to be the maximum. While, specificity, Fm, and Fc need to be the least. Such as, the Fm which indicate the portion of mortal group which birth weight was more than the threshold, which could not be detected as mortal. Any way, the

maximum efficiencies were obtained for the three breeds, whereas crossbred maintained the highest.

These results indicated that screening test is probably adequate to detect calves at each extreme, such as clearly healthy calves and clearly calves in mortal group, which must get special management and veterinary health care in advance in order to reduce mortality rate. In epidemiology, thresholds are important to classify the screening test results into two groups survival and mortal where as in this work, the values of birth weight were used as threshold point to classify mortal and survival groups for each breed and sex.

Table 1: Birth weight for males and females of Friesian, Sharabi and Crossbred calves in survival group (kg).

Breed	male			female			Significant difference between male and female
	n	$\overline{X}$	S	n	$\overline{X}$	S	
Friesian	61	30.82[a]	5.68	65	29.11[a]	5.09	0.05
Sharabi	89	20.94[b]	4.44	120	18.42[b]	3.32	0.001
crossbred	62	30.19[a]	4.96	49	28.10[a]	3.81	0.01

Mean with different superscripts a, b, within column differ significantly ($P < 0.01$).

Table 2: Birth weight for males and females of Friesian, Sharabi and Crossbred calves in mortal group (kg).

Breed	male			female			Significant difference between male and female
	n	$\overline{X}$	S	n	$\overline{X}$	S	
Friesian	10	24.70[a]	3.53	13	25.23[a]	4.36	ns
Sharabi	24	16.33[b]	2.55	37	16.03[b]	3.21	ns
crossbred	6	23.67[a]	3.61	4	21.75[a]	4.50	ns

ns = not significant, ($P > 0.05$).

Mean with different superscripts a, b, within column differ significantly ($P < 0.01$).

Table 3: Mortality rate in Friesian, Sharabi and Crossbred calves.

breed	both sexes		Male		Female		Significant difference between male and female
	%	SE	%	SE	%	SE	
Friesian	15.44^{b}	0.030	14.08^{ab}	0.041	16.67^{ab}	0.042	ns
Sharabi	22.59^{a}	0.025	21.24^{a}	0.038	23.57^{a}	0.034	ns
crossbred	8.26^{c}	0.025	8.82^{b}	0.034	7.55^{b}	0.036	ns

SE = standard error

ns = not significant, ($P > 0.05$).

Mortality rate with different superscripts a, b, within column differ significantly ($P < 0.01$).

Table 4: Point – Biserial correlation (r_{pb}) between mortality rate and birth weight in Friesian, Sharabi and Crossbred calves.

breed	male	female	both sexes
Friesian	- 0.368**	- 0.282*	- 0.324**
Sharabi	- 0.419**	- 0.296**	- 0.310**
crossbred	- 0.360**	- 0.430**	- 0.363**

* $P < 0.01$

** $P < 0.001$

Table 5: Screening test for classification groups due to birth weight in Friesian, Sharabi and Crossbred calves.

breed	sex	Threshold (kg)	Sensitivity	Specificity	Fc	Fm	efficiency
Friesian	male	25.6	0.800	0.098	0.113	0.200	0.887
	female	26.6	0.846	0.154	0.154	0.154	0.846
Sharabi	male	16.6	0.750	0.112	0.142	0.250	0.858
	female	16.1	0.784	0.192	0.197	0.216	0.803
Crossbred	male	24.6	0.833	0.065	0.074	0.167	0.926
	female	22.6	0.750	0.041	0.057	0.250	0.943

Fc = false total classification.

Fm = false mortal group.

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