Effect of season, number of service and station on conception rate and calf sex for dairy cow in sulaimania region

[1]Faraidoon, A. M, Amin, [1]Talib, G. M. Ali, [2]Burhan, S. Muhammad and [2]Sherawan, A. Muhammad

[1] Department of Surgery and Theriogenology, College of Veterinary Medicine, Sulaimania University, Iraq.

[2] Department of Artificial Insemination, Veterinary Directorate, Sulaimania, Iraq.

E.mail: fsams969@yahoo.com

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Summary

The objective of the present study was to evaluate the effect of season and first, second and third services on reproductive efficiency of 1086 cows throughout the artificial insemination technique during 2012 as well as the effect of season of the year on the conception rates in cows in Sulaimani Region. The conception rate of first, second and third services were 69.3, 27.5, and 3%, respectively, with overall conception rate 45%. The total number of male calves born was 282 and the female calves were 211. The conception rate obtained at the Halabja station reached its highest value followed by Sharazoor station then Chamchamal station. Rania station performed the lowest value. The conception rate in the Sharazoor station at the spring months reaching its highest value follow at the winter months then at the autumn months, while at the summer months it performed lowest value. The results of the this work is concluded that a good season of fertility of the cows of Halabja is in winter to summer months, while in Sharazoor and Rania the fertility is better in winter to spring and in Chamchamal the good seasons of fertility are relatively similar.

Keywords: Artificial insemination, Conception rate, Seasons, Dairy cows.

Introduction

Artificial insemination is the oldest and currently most common assisted reproductive biotechnology and an important tool in cows production (1). Artificial insemination has become one of the most important techniques for the genetic improvement of cows and reduces transmission of venereal diseases (2). Despite the wide application and success of AI throughout the developed countries, the success rate in the developing countries is still low owing to a number of technical, system related, financial and managemental problems. However it faced a major challenge of low conception rate and repeated breeding of inseminated cows (3 and 4).

The history of artificial insemination of cows in Sulaimani region / Iraqi Kurdistan goes back to 1970 by Veterinary Directorate in Bakrajo district (5). Different factors were reported to affect the conception rate and fertility of cows including those related to the cow management: AI services, semen quality, bull fertility, poor nutrition, the time of artificial insemination, embryonic mortality, short duration of estrus and the effects of different seasons of the year (6-9). Vanraden, (10) indicated that for all breeds, fertility is best with fall calving and poorest with spring calving because fewer cows express estrus or conceive during hot summer months. Amin (11) showed that the fertility rate of cows artificially inseminated in Sulaimani region during 1999 was (5, 19%), 2000 (26.62%), 2001 (48.51%) and 2002 (42.60%).The same study indicated that the fertility rate of cows artificially inseminated in 2002 at different AI centers in Sulaimani region as in Sulaimani province, Rania, Chamchamal, Sharazoor and Kalar center were 51.85%, 64.70%, 14.71%, 44.03%, and 80.90%, respectively. The main objective of this work was to study the effects of season, insemination number, AI center station on cows fertility rats and calf sex in Sulaimania region.

Materials and Methods

The study was conducted at artificial insemination department in Veterinary directorate in Sulaimani province and department of Surgery and Theriogenology at the College of Veterinary Medicine/Sulaimani

University/Sulaimani/Kurdistan region. The number of cows artificially inseminated in 2012 were 1086.The frozen method of AI that had been used in the study was frozen semen. The frozen semen was obtained from the Artificial Tnsemination Department in Veterinary directorate in Sulaimani province-origin. The frozen semen was distributed to four AI stations at Sulaimani region namely: Halabja, Sharazoor, Rania and Chamchamal. In this study. Individual records of each cow was obtained from AI stations (Halabja, Sharazoor, Rania, Chamchamal) of cows artificially inseminated during different seasons. During the study, data were obtained from each station: Conception was determined by rectal palpation 60-90 days following insemination, inseminator identity, cow identity, season of the year, day of insemination, sex of calf, body condition and cows management system. Conception rate was estimated using the following equation:

$$\text{Conception rate} = \frac{\text{Number of conception}}{\text{Number of services}} \times 100$$

A year in Kurdistan region can be divided into four seasons: winter, spring, summer and autumn. The winter months are (January, February, March).The spring months are (April, May, June). The summer months are (July, August, September) and the autumn months are (October, November, December).

Data of different stations of conception rate were analyzed by using $(X)^2$ chi-square test. $P<0.01$ was considered as significant results.

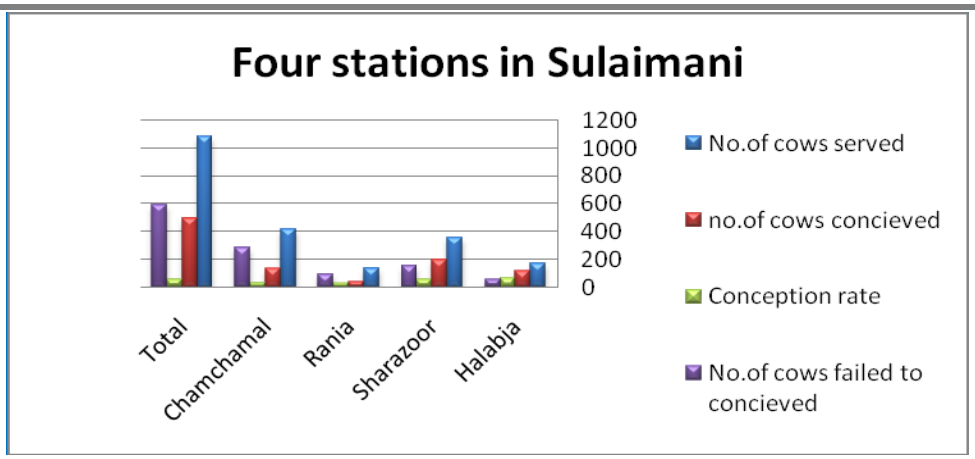
Results and Discussion

The total numbers of cows artificially inseminated at different AI stations of Sulaimani region during 2012 were 1086; however, the overall conception rate attained in this study was 45.3 %,and the total number of male calves was 282 while female calves was 211 (Table, 1).

The conception rate obtained at the Halabja AI station reached its highest value following Sharazoor station then Chamchamal station. While Rania station performed the lowest value (Table, 1; Figure, 1) which is affected by different seasons of the year 2012. At the Halabja station, the conception rate reached its lowest value in autumn months and highest in summer months and the total number of male calves was 56 ,while female calves was 59 (Table, 2; Figure, 2). However, in (Table, 3; Figure, 3), showed that the conception rate in the Sharazoor station at the spring months reached its highest value following the winter months then at the autumn months, while at the summer months, it performed lowest value and the numbers of male calves to female reach 117 to 83. In this study in the Rania station, (Table, 4 and Fig.4), revealed that the conception rate in the inseminated cows in the winter season reached its highest value and lowest value in the autumn season, while (Table, 5 and Fig. 5) showed that the conception rate at the autumn season reached its highest value than other seasons. The conception rate at first service was 69.3% and was 27.5%, 3% at second and third service respectively (Table, 6).

Table, 1: The conception rate of cows and calf sex in different AI stations of Sulaimani region.

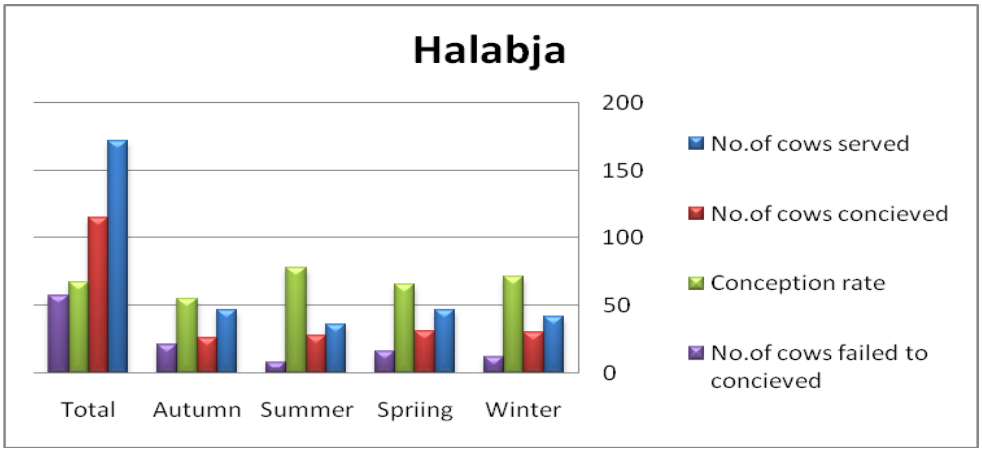
A.I Station	Number of cows served	Number of cows conceived	Conception rate %	Number of cows failed to conceived	Sex of calf	
					male	female
Halabja	172	115	66.8	57	56	59
Sharazoor	357	200	56	157	117	83
Rania	139	42	30.2	97	23	19
Chamchmal	418	136	32	282	86	50
Total	1086	493	45.5	593	282	211



Figure, 1: The conception rate of cows and calf sex in different AI stations of Sulaimani region.

Table, 2: The conception rate calf sex in different seasons for Halabja station.

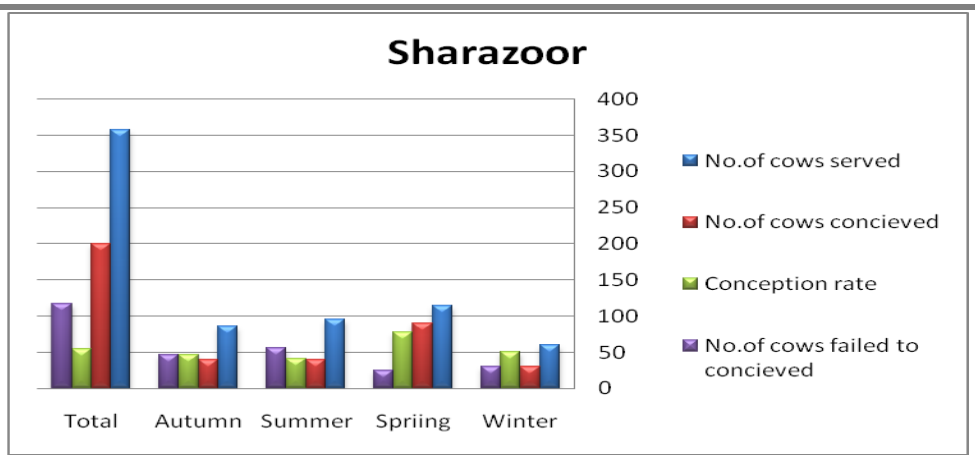
A.I Station (Halabja)	Number of cows served	Number of cows conceived	Conception rate %	Number of cows failed to conceived	Sex of calf	
					Male	Female
Winter	42	30	71.4	12	15	15
Spring	47	31	65.9	16	16	15
Summer	36	28	77.7	8	15	13
Autumn	47	26	55.3	21	10	16
Total	172	115	67.5	57	56	59



Figure, 2: The conception rate calf sex in different seasons for Halabja station.

Table, 3: The conception rate of cows and sex of calf in different seasons for Sharazoor station

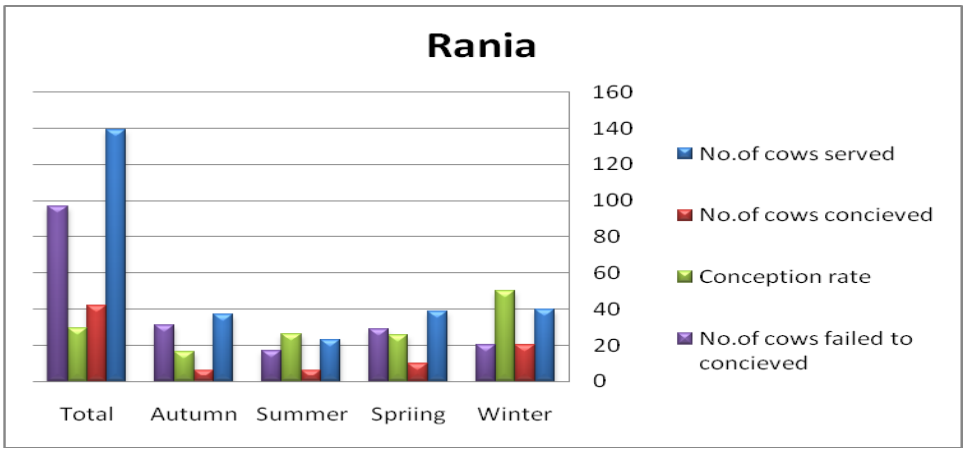
A.I Station (Sharazoor)	Number of cows served	Number of cows conceived	Conception rate %	Number of cows failed to conceived	Sex of calf	
					Male	Female
	60	30	50	30	14	16
Spring	115	90	78.2	25	61	29
	96	40	41.6	56	20	20
Autumn	86	40	46.5	46	22	18
	357	200	54	157	117	83



Figure, 3: The conception rate of cows and sex of calf in different seasons for Sharazoor station

Table, 4: The conception rate of cows calf sex in different seasons for Rania station.

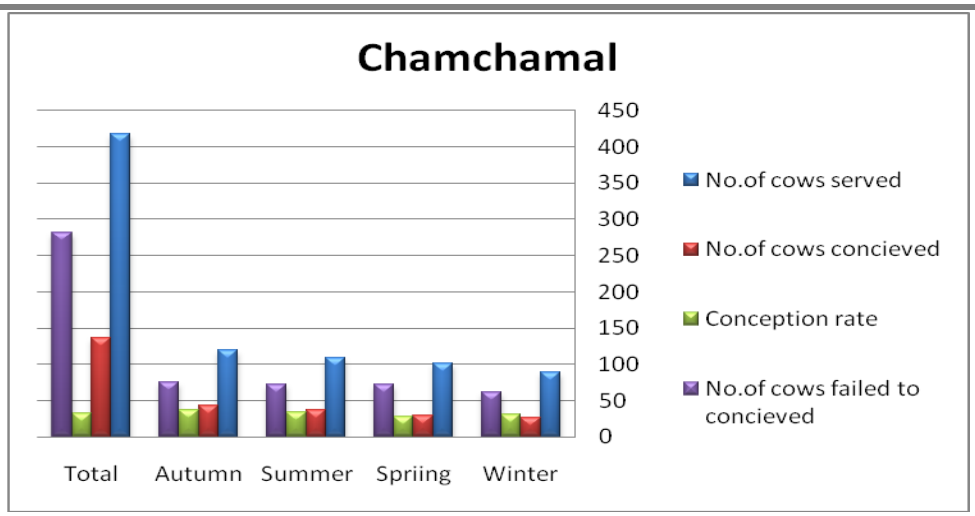
A.I Station (Rania)	Number of cows served	Number of cows conceived	Conception rate %	Number of cows failed to conceived	Sex of fetus	
					male	Female
	40	20	50	20	12	8
Spring	39	10	25.6	29	5	5
	23	6	26.08	17	2	4
Autumn	37	6	16.2	31	4	2
	139	42	29.47	97	23	19



Figure, 4: Histogram the conception rate of cows and sex of cale in different seasons in different seasons for Rania station.

Table, 5: The conception rate of cows and sex of the calf in different seasons for Chamchamal station.

A.I Station (Chamchmal)	Number of cows served	Number of cows conceived	Conception rate %	Number of cows failed to conceived	Sex of fetus	
					Male	female
	89	27	30.3	26	14	13
Spring	101	29	28.7	72	20	9
	109	37	33.9	72	25	12
Autumn	119	43	36.1	76	27	16
	418	136	32.2	282	86	50



Figure, 5: Histogram the conception rate of cows and calf sex in different seasons for Chamchamal station.

Table, 6: Number of inseminations per conception cows in four stations in Sulaimani regin.

Total number of cows conceived	Number of cows conceived from first insemination	Number of cows conceived from second insemination	Number of cows conceived from third insemination
493	342 (69.3%)	136 (27.5%)	15 (3%)

The conception rate of first service was 69.3%, second service was 27.5% and 3% in the third service (Table, 6) was higher than reported by (8). The conception rate were significantly P<0.01 higher in Halabja which is 66.8%, compared to the lowest value in Sharazoor, Rania and Chaamchamal. The overall mean conception observed in this study was 45.3 % higher than the average conception rate in Sulaimani region from 1999 to 2002 as reported by (11). Also it was higher than that reported by (12) and almost similar to that reported by (8) in Ghana from 1998 to 2007, and Foat (2002) (13) reported fertility rate 74% and suggested that good semen dilution of bull lead to the increase in the conception rate, but lower than the (4) in Ethiopia. Season as a factor is associated with postparetum anestrous, and this effect is not due to nutrition or management differences. Several studies demonstrated the effect of seasons on fertility in cattle (2, 13 - 15). Seasons in the year of study had significant P<0.01 effects on conception rate; these results were in agreement with those found by (8 and 16).

The results illustrated (Table, 2) at the Halabja the conception rate were significantly P<0.01 higher in summer moths which was 77.7% following at the winter months 71.4%, then at the spring months 65.9%, while at the autumn months 55.3% performed lowest value. These findings agree with the findings of (2 and 17) who found that the fertility of cows were higher during summer months with long but not too warm days as compared with winter months.

The conception rates in Sharazoor and Chamchamal in this study (Tables, 3 and 5) were higher than those recorded by Amin (11) in the same region, but the Rania (Table, 4) it was lower than recorded by Amin (4 and 11) These differences could be due to the year temperature of the study and had significant P<0.01 effect on conception rate. The (Tables, 3 and 4) revealed that the conception rates in the Sharazoor and Rania was higher in the winter and spring season than in the summer and autumn seasons (warm seasons). These variations could be attributed to the abundant supply of good quality fodder during the rainy seasons (winter and spring) and might have improved the body condition of cows thus improving their conception rates (8). Al-Ghrani (18) in Baghdad reported that natural insemination lead to pregnancy rate ranging

between 72-85% and concluded the good fertility in cows could be due to good management and low percentage of reproductive problem as well as the fertility program during first 15 days after giving calf. Also (11) mentioned that the heat stress during the summer months has a direct adverse effect on increased body temperature and hence uterine temperature leading to fertilization failure which would lead to increased early embryonic loss and effect of pre-attachment stage and decreases embryo development (19). As well, it would have the effect of stress on pre ovulatory LH surge and patteren of follicle develop and selection and quality of follicle. The conception rate in Chamchamal (Table, 5) station during the four seasons was relatively similar to each other slightly higher in the summer and autumn months; therefore (20 and 21) mentioned that the seasonal effect in reproduction has been shown to be caused by variation in day length and mediated by melatonin. Results reported by present study suggested that season is a factor associated with postpartum anestrous and this effect is not due to nutritional or management differences, fertility effect associated with seasonal changes and effects related to changing in photoperiods, heat stress (13).

This study concluded that a good season of fertility of the cows of Halabja is in winter to summer months while in Sharazoor and Rania fertility is better in winter to spring and in Chamchamal the good seasons of fertility are relatively similar.

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تقييم الكفاءة التناسلية من خلال تقنية التلقيح الصناعي لأبقار الحليب في منطقة السليمانية

[1]فريدون عبد الستار محمد امين و[1]طالب غيدان منت علي و [2]برهان صابر محمد و [2]شيروان عبد الله محمد

[1]فرع الجراحة والتوليد، كلية الطب البيطري، جامعة السليمانية، العراق.

[2] مركز التلقيح الصناعي البيطري، السليمانية، العراق.

E.mail: fsams969@yahoo.com

الخلاصة

تهدف الدراسة لمعرفة تاثير الفصل المناخي على الكفاءة التناسلية لـ 1086 بقرة ملقحة صناعيا في منطقة السليمانية من خلال دراسة نسب الاخصاب خلال عام 2012 اعتمادا على تسجيل نسب الحمل من التلقيحة الاولى والثانية والثالثة وكذالك عدد ونوع المواليد. أظهرت النتائج بان 493 بقرة اصبحت حامل و نسبة الاخصاب والحمل للتلقيحة الاولى والثانية والثالثة كانت 69.3 % 342 بقرة و 27,5 % بقرة 136 و3% بقرة 15 على التوالي وبمعدل 45% وكانت اعداد المواليد من العجول 493 منها 211 اناث و282 من الذكور. اعلى نسبة للاخصاب كانت في محطة حلبجة 66.8 ثم شارزور 56 ثم جمجمال 32.2 واقلها في محطة رانية 30,2. تستنتج الدراسة ان افضل موسم للخصوبة في محطة حلبجة كان في فصلي الشتاء والربيع محطة شارزور كان خلال فصل الربيع و اما رانية كانت نسبة الخصوبة عالية خلال موسم الشتاء اما محطة جمجمال فكانت اعلى نسبة فصل الخريف.

الكلمات المفتاحية: التلقيح الصناعي، نسب الاخصاب، الموسم , ابقار الحليب.