Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.7089

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (6):** 488-491 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Sire, AI Operator, Lactation Number & Year of Insemination on Conception Rates in Khillar Cattle under Field Conditions

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Received: 14.11.2018 | Revised: 20.12.2018 | Accepted: 27.12.2018

ABSTRACT

The present study was carried out to study the conception rate of artificially inseminated khillar cattle with effect of sire, AI operator, Year of insemination, Lactation number under field condition. The study was conducted at different cattle development centres run by BAIF in Maharashtra state during the period from 2010 to 2014. Multivariate logistic regression method was employed to estimate conception rate from 2169 inseminations records. The overall mean conception rate was 60.58%. Year of insemination and AI operator showed significant variation in conception rate while no significant difference was found in conception rate due to sire & lactation number. Out of 15 AI operator, 9 operators were comparable, since the differences are statistically insignificant. Insemination records ranging from 60 to 209.There was no significance in lactation wise study highest conception was found in third lactation 68.43% while lowest conception rate was found in heifers 58.64%.Odds ratio of 2013 was lower (OR: 0.67) than our reference value of year 2010. Highest odds ratio found in year 2014 with estimated conception rate 59.12%. Six sires were used for current study conception rate was not shown statistically significant effect due to sire in present study. The insemination records ranged between 138 to 981.The Odds ratio of a bulls was higher than reference value however, mostly statistically non-significant. Therefore management can play important role in monitoring performance of AI operator in field condition.

Key words: *Sire, AI operator, Multivariate logistic regression, Conception rate.*

INTRODUCTION

Livestock sector plays an important role in the welfare of India's rural population. The cattle biodiversity in India constitutes 40 well-defined breeds of cattle apart from nondescript types and some lesser known breeds, which constitute around 75 per cent of the total cattle population. There are five cattle breeds form Maharashtra namely Dangi, Khillar, Red Kandhari, Gaulao & Deoni. Out of these Khillar cattle is classified as draught cattle breed of India. The breed owes its origin from Hallikar breed of cattle from Mysore state. Khillar is pride of Maharashtra and its home tract is Marathwada and border districts of western Maharashtra districts & Karnataka.

Cite this article: Potdar, V.V., Marimuthu, S. and Khadse, J. R., Effect of Sire, AI Operator, Lactation Number & Year of Insemination on Conception Rates in Khillar Cattle under Field Conditions, *Int. J. Pure App. Biosci.* **6(6):** 488-491 (2018). doi: http://dx.doi.org/10.18782/2320-7051.7089

The present investigation was planned to determine the influence of AI operators, bulls, year of insemination and Lactation number on conception rates in Khillar cattle population in field conditions.

MATERIAL AND METHODS

The present study was conducted in cattle development centres run by BAIF in Maharashtra (Jalgaon and Beed). Study covered the period was during year 2010 to 2014.The data consisted of 2169 insemination records pertained to Khillar cattle that were inseminated artificially at BAIF's field AI centers which provide door-step AI service at villages. Data were classified on the basis of A.I. operator, Lactation Number, year of insemination and A.I. bulls. The frozen semen of Khillar bulls was utilized for Artificial Insemination. Conception rates (CR) were estimated from the proportion of pregnancies confirmed by the rectal palpation of the genital tract between 90 to 120 days of post insemination among the total number of cows inseminated artificially in a specified period of time. Insemination dates were recorded using the electronic data loggers and stored in SQL server. For each cow the conception rate (CR) was defined as pregnant or not-pregnant.

Statistical analysis

Conception rate is a binary trait having only one of the two possibilities namely, success or failure. The most popular technique of multiple analysis technique poses difficulty when the dependent variable has only two out comes i.e. event occurring or not-occurring. In such a data-set the assumption of normal distribution and equality of variances are violated. However, logistic regression model is advocated to be a better choice[6,7,9,8,5,2] and hence adopted in the present study. Data of bulls with 25 or more A.I.s was initially selected for study. AI operator with less than total 25 A.I. were excluded from the study on consideration of statistical precision. After such sorting, observations of AI per bulls with minimum 30 inseminations records were finally saved as clean data. To investigate if differences in conception rate existed between different subclasses of independent variables, a logistic regression model was constructed with conception rate as the dependent variable and the independent variables of interest were category of A.I. operator, A.I. bulls, Lactation Number of cattle.

RESULTS AND DISCUSSION

The results of analysis of conception rate using multivariate logistic regression model is presented in tables below. The overall mean conception rate of the was 60.58%.

Effect of A.I. operator

The skill of A.I. operator is a major factor which influence conception rate in field condition. In the present study, conception rate showed significant variation due to A.I. operators. Similar kind of study was done by Anzar *et al*.[1], Gokhale and Bhagat[3] and Hossain *et al*.[4].While Patricia *et al*.[8] reported no significant effect of AI technician on pregnancy rate. Overall 15 A.I. operators carried out 2169 inseminations ranging from 60 to 209 AI.

Amongst all them AI technicians 3 ,4 and 5 who carried out 195,120 & 173 inseminations with estimated conception rate 46.15%,54.17% & 54.91% showed highly significant than others. AI operator 6,10 & 14 have shown significant effect.

There were 6 operators which exhibited statistically significant and lower success rates than the average. It means that the performance of remaining 9 operators is comparable, since the differences are statistically insignificant in spite of insemination records & the odd ratio ranging widely.

Table 1: AI Operator wise conception rate

AI OPERATOR	Means	N	Odds Ratio	Probability(1)	Estimated conception rate(2)	Significance level
1	69.86	209	1	0.5	69.86	NS
2	67.82	202	0.87	0.47	64.98	NS
3	46.15	195	0.37	0.27	37.69	***
4	54.17	120	0.48	0.32	45.34	**
5	54.91	173	0.56	0.36	50.12	**
6	54.41	136	0.55	0.36	49.64	*
7	71.84	103	0.85	0.46	64.11	NS
8	63.95	147	0.77	0.44	60.79	NS
9	61.64	146	0.78	0.44	61.10	NS
10	46.67	60	0.43	0.30	41.90	*
11	65.18	112	0.95	0.49	68.08	NS
12	64.77	88	0.90	0.47	66.13	NS
13	62.75	153	0.65	0.40	55.23	NS
14	60.69	173	0.65	0.40	55.23	NS
15	59.21	152	0.65	0.40	55.23	*

Effect of year of insemination

There was significant difference found in conception rate due to year of insemination during year 2011. Odds ratio of 2013 was lower (OR: 0.67) than our reference value of year 2010. Highest odds ratio found in year 2014 with estimated conception rate 59.12%

Table 2: Year of Insemination wise conception rate

YEAR	Means	N	Odds Ratio	Probability(1)	Estimated conception rate(2)	Significance level
2010	65.23	394	1	0.5	65.23	NS
2011	59.02	471	0.70	0.41	53.65	*
2012	56.91	608	0.68	0.41	52.95	NS
2013	56.52	299	0.67	0.40	52.51	NS
2014	66.50	397	0.83	0.45	59.12	NS

Effect of Lactation Number

There was significant difference found in conception rate due to lactation number in heifers of Khillar cattle. Odds ratio in heifers was lowest (0.72) with estimated conception rate 58.64% while highest odds ratio found in four and above lactation with estimated conception rate of 65.08%.

Table 3: Lactation Number wise conception rate

LACTATION NO	Means	N	Odds Ratio	Probability(1)	Estimated conception rate(2)	Significance level
HEIFER	57.72	842	0.72	0.42	58.64	*
ONE	58.47	378	0.74	0.42	59.32	NS
TWO	62.95	359	0.96	0.49	68.43	NS
THREE	64.00	275	0.86	0.46	64.63	NS
FOUR & ABOVE	65.08	315	1	0.5	65.08	NS

Effect of sire

There was no significant difference in the conception rate in khillar cattle due to sire. Of the 6 sire included in the study all sires exhibited higher fertility which was statistically not significant the range of insemination records from 138 to 981, the Odds ratio of a A.I. bulls was higher than reference value, although the values are statistically non-significant. Smaller sample sizes may result in greater variability among sires. The present results are in accordance with the study of Dash *et al*. and Bhagat *et al*.[3], Hossain *et al*.[4] found non-significant effect of different bull semen on pregnancy rate.

Table 4: Sire wise conception rate

SIRE	Means	N	Odds Ratio	Probability(1)	Estimated conception rate(2)	Significance level
1	63.73	306	1.00	0.50	63.73	NS
2	60.55	981	0.89	0.47	60.20	NS
3	58.74	286	0.79	0.44	56.24	NS
4	59.03	310	0.90	0.47	60.42	NS
5	69.57	138	1.19	0.54	69.26	NS
6	52.70	148	0.77	0.43	55.27	NS

Significance codes: 0.001 '**', 0.01 '*', NS-Non significant. The figure of 0.5 under Relative Probability indicates the reference figure for comparison with others as chosen by the Logit Regression Analysis method. The figure are odd ratio of Success (or Failure)/Number of events. Viz. Conceived (or Not Conceived)/ Number of AI. 2 Estimated conception rates are computed after substituting actual figure (LS mean) in place of First reference values, converting the rest of the odds ratios accordingly and multiplying by 100.

CONCLUSIONS

Study clearly indicates that AI operators, year of insemination & heifers have significant effect over conception rate while sire didn't make any difference in conception rate. It amply demonstrated that the study of this nature on binary traits should be based on large sample size and the inferences drawn with analysis of smaller data-sets might prove misleading.

Acknowledgments

The authors are grateful for the support provided by the Senior Vice president, colleagues of BAIF Development Research Foundation, field team. The encouragement by President of BAIF for the study is duly acknowledged.

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