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Research Article
Mortality and Culling Pattern of Tharparkar Cattle Males in an Organised Herd

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Abstract

Background: A study was planned to analyze mortality and culling pattern across different periods and seasons of birth on 154 Tharparkar cattle males in National Dairy Research Institute (NDRI) herd. **Materials and Methods:** Records of 154 Tharparkar males born during the period 1997-2012, Livestock Research Centre (LRC), ICAR-NDRI, Karnal, were analyzed to study the mortality and culling pattern in different age groups. The percent of animal disposed from the herd due to different reasons was calculated by proportion using descriptive statistics. **Results:** The overall disposal rate due to mortality and culling in different age groups of 0-1, 1-2, 2-3, 3-6, 6-18 months, 18 months to 3 years and 3-5 years were 16.9, 13.2, 9.8, 34.7, 40.9, 23.1 and 40.0%, respectively. The main reason of mortality in different age groups was general debility (9.09%) followed by respiratory problems (3.90%) and enteritis/ gastroenteritis (2.60%), whereas main reason of culling in TP males were surplus (40.00%), poor growth (2.86%) and poor libido (2.86%). Season of birth was found to have significant effect on overall disposal rate in 1-2, 2-3, 3-6, 6-18 months and 18 months to 3 years age groups. **Conclusion:** At initial age of life, better managemental care is imperative to reduce the mortality and shifting of calving season to suitable season through managerial decision would reduce the disposal rate. Maximum disposal as surplus may be due to culling of more number of Tharparkar males after attainment of targeted or required frozen semen doses which reflect the efficient management of the farm.

Key words: Tharparkar, cattle, disposal pattern, culling, mortality

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Indigenous breeds of cattle plays an important role by contributing substantially to the economy of the country. They are often a livelihood for poor households as well as they are used in breeding programs for their unique characteristics like diseases resistance, heat tolerance ability, low input conditions etc. Tharparkar is unique milch/dual-purpose pure breed of desert belt of Jaisalmer in Rajasthan having white majestic robust look. The breed is famous for its well adaptability in arid and semi-arid regions, thrive under extreme nutritional stress, very hardy, resistant to drought and several tropical diseases/parasite. It also shows better reproductive efficiency and proficient converter of poor quality roughages in milk with better fat percentage as compared to local breeds[1]. The impact of breed improvement programmes initiated earlier through grading up of the local non-descript cattle with improved indigenous breeds has not been very encouraging so far. This may be due to inadequate number of elite pedigreed or progeny tested bulls, low production levels of indigenous breeds, irregular and short term basis breeding plan[2]. To improve the breeding stocks through selective breeding and accelerate the pace of genetic progress in a breeding programme, knowledge of disposal pattern regarding reasons of mortality and culling is the need of the hour. Despite the fact that the Tharparkar cattle are extensively used for dual purposes, no serious efforts were made to evaluate their performance in all respects including selection of males and information of disposal pattern. Mortality and culling together constitute disposal pattern in animals. Mortality was more in crossbred cattle than in indigenous breed[3]. Various researchers reported that higher prevalence of disease syndrome leading to death of younger calves were pneumonia and enteritis[4-7]. Inadequate housing for newborn calves, climatic change and lack of care might contribute to the high prevalence of these diseases. Culling is the practice to remove the undesirable animals from the herd due to health and reproductive reasons. This helps to obtain phenotypic and genetic improvement of the herd animals through effective selection and pressure. A higher average culling rate is associated with a more than 5% decrease in herd size[8]. Major causes of culling in cattle were associated with surplus, poor growth, off breed, reproductive problems (poor libido, poor semen quality and freezability)[9-12] etc. Some researchers report that the seminal parameters are poor in crossbred bulls than the indigenous breeds[13,14] which is one of the main reasons of culling in adult cattle. The knowledge of disposal pattern of the cattle at various age is very essential in a given herd to maintain proper animal welfare, herd structure and farm economy. Therefore, the present study was undertaken to analysed the performance record regarding its disposal pattern of male in organized herd.

MATERIALS AND METHODS

Data on the disposal pattern of 154 Tharparkar males born over a period of 16 years (1997-2000) at ICAR-NDRI, Karnal, Haryana were collected to study the effect of period of birth (P1, 1997-2000; P2, 2001-2004; P3, 2005-2008 and P4, 2009-2012) and season of birth (December- March, winter: S1; April-June, summer: S2; July-September, rainy: S3 and October-November, autumn: S4) on culling and mortality pattern. Data were collected from birth register, livestock register and disposal registers. The mortality pattern leading to the disposal of males at different age groups are discussed under seven categories, viz. 0-1, 1-2, 2-3, 3-6, 6-18 months, 18 months to 3 years and >3 years. Reasons for culling of Tharparkar males reserved for breeding were studied based on four different age groups, viz., <1.5, >1.5-3, >3-5 and >5 years. Out of 154 TP male calves born at ICAR-NDRI herd during the period 1997-2012, 22.73% were reserved for breeding based on pedigree performance i.e., dam's best 305 day lactation yield and expected predicted difference. Reserved males were subsequently raised and trained for semen donation but a number of them were disposed due to various reasons before reaching sexual maturity. Body weight of the breeding bulls varied from 400-595 kg and scrotal circumferences from 36-44 cm. Bulls were maintained under standard management conditions and health.

Statistical analysis: Chi square test was used to test the differences in mortality, culling and disposal rates across different periods and seasons of birth. Reasons of death of TP males were classified into different categories and the percent of males died from the herd due to some specific reasons was estimated in different age group. Culling pattern was studied for the males reserved for breeding on the basis of pedigree performance and Expected Predicted Difference (EPD).

RESULTS

Overall disposal rate in TP males due to mortality and culling in different age group have been summarised and presented in Table 1. Overview of the results indicated that higher overall disposal rate in different age group was due to culling, except mortality in 0-1 months age group. The effect of period of birth and season of birth on disposal of TP males

Table 1: Overall disposal rate in different age group of Tharparkar males

Age groups	No. of males available	Culled	Died	Overall disposed
0-1 months	154	9 (5.84)	17 (11.04)	26 (16.88)
1-2 months	129	12 (9.30)	5 (3.88)	17 (13.18)
2-3 months	112	11 (9.82)	0	11 (9.82)
3-6 months	101	29 (28.71)	6 (5.94)	35 (34.65)
6-18 months	66	22 (33.33)	5 (7.58)	27 (40.91)
18 month-3 years	39	8 (20.51)	1 (2.56)	9 (23.08)
3-5 years	30	12 (40.00)	0	12 (40.00)

Values in parentheses indicate percentage

Table 2: Effect of period and season of birth on disposal rate of different age groups

Effects		0-1 months	1-2 months	2-3 months	3-6 months	6-18 months	18 months-3 years	3-5 years	Overall disposed
Period of birth									124
P1	No. of males available	19	16	11	9	6	6	4	
	Mortality	2 (10.53)	1(6.25)	0	1 (11.11)	0	0	0	4 (3.23)
	Culling	1 (5.26)	4 (25.00)	2 (18.18)	2 (22.22)	0	2 (33.33)	1 (25.00)	12 (9.68)
	Disposed	3 (15.79)	5 (31.25)	2 (18.18)	3 (33.33)	0	2 (33.33)	1 (25.00)	16 (12.90)
P2	No. of males available	11	8	8	6	4	2	0	
	Mortality	2 (18.18)	0	0	1 (16.67)	0	0	0	3 (2.42)
	Culling	1 (9.09)	0	2 (25.00)	1 (16.67)	2 (50.00)	2 (100.00)	0	8 (6.45)
	Disposed	3 (27.27)	0	2 (25.00)	2 (33.33)	2 (50.00)	2 (100.00)	0	11 (8.87)
P3	No. of males available	61	49	42	36	18	10	8	
	Mortality	7 (11.48)	3 (6.12)	0	3 (8.33)	2 (11.11)	0	0	15 (12.10)
	Culling	5 (8.20)	4 (8.16)	6 (14.29)	15 (41.67)	6 (33.33)	2 (20.00)	2 (25.00)	40 (32.26)
	Disposed	12 (19.67)	7 (14.29)	6 (14.29)	18 (50.00)	8 (44.44)	2 (20.00)	2 (25.00)	55 (44.35)
P4	No. of males available	63	56	51	50	38	21	18	
	Mortality	5 (7.94)	1 (1.79)	0	1 (2.00)	3 (7.89)	-	-	10 (8.06)
	Culling	2(3.17)	4 (7.14)	1 (1.96)	11 (22.00)	14 (36.84)	-	-	32 (25.81)
	Disposed	7 (11.11)	5 (8.93)	1 (1.96)	12 (24.00)	17 (44.74)	-	-	42 (33.87)
	x^2 value for disposal rate	2.30	7.21	6.46	6.58	5.91	5.03	0.46	
Season of birth									128
S1	No. of males available	46	39	35	29	22	10	9	
	Mortality	4 (8.70)	0	0	3 (10.34)	3 (13.64)	0	0	10 (7.81)
	Culling	3 (6.52)	4 (10.26)	6 (17.14)	4 (13.79)	9 (40.91)	1 (10.00)	0	27 (21.09)
	Disposed	7 (15.22)	4 (10.26)	6 (17.14)	7 (24.14)	12 (54.55)	1 (10.00)	0	37 (28.90)
S2	No. of males available	46	38	35	34	15	12	12	
	Mortality	8 (17.39)	3 (7.89)	0	1 (2.94)	2 (13.33)	0	0	14 (10.94)
	Culling	0	0	1 (2.86)	18 (52.94)	1 (6.67)	0	2 (16.67)	22 (17.19)
	Disposed	8 (17.39)	3 (7.89)	1 (2.86)	19 (55.88)	3 (20.00)	0	2 (16.67)	36 (28.13)
S3	No. of males available	41	32	22	18	16	7	3	
	Mortality	3 (7.32)	2 (6.25)	0	2 (11.11)	0	1 (14.29)	0	8 (6.25)
	Culling	6 (14.63)	8 (25.00)	4 (18.18)	0	9 (56.25)	3 (42.86)	1 (33.33)	31 (24.22)
	Disposed	9 (21.97)	10 (31.25)	4 (18.18)	2 (11.11)	9 (56.25)	4 (57.14)	1 (33.33)	39 (30.47)
S4	No. of males available	21	20	20	20	13	10	6	
	Mortality	1 (4.76)	0	0	0	0	0	0	1 (0.78)
	Culling	0	0	0	7 (35.00)	3 (23.08)	4 (40.00)	1 (16.67)	15 (11.72)
	Disposed	1 (4.76)	0	0	7 (35.00)	3 (23.08)	4 (40.00)	1 (16.67)	16 (12.50)
	x^2 value for disposal rate		3.10	15.20**	9.12*	13.31**	8.70*	11.06*	3.23

P: Period of birth, S: season of birth, Values in parentheses indicate percentage; *x($p<0.05$), **x($p<0.01$)

of different age groups are presented in Table 2. It was observed that P3 and P2 period has the maximum (44.35%) and minimum (8.87%) disposal rate. The effect of period of birth were found to be non significant for overall disposal rate for different age group of TP males. Across the seasons of birth, overall disposal rate was highest in rainy (30.47%) and lowest in autumn (12.50%) season born males. In the age groups 2 and 3-6 months, effect of seasons of birth was found to be statistically significant ($p<0.01$) for overall disposal rate.

The mortality pattern in different age groups of TP males has been presented in Table 3. The main contributing factor to mortality in different age groups (0-1, >1-2, >2-3, >3-6, >6-18 months, 18 months to 3 years and >3 years) of TP males was general debility (9.09%) followed by respiratory problems

Table 3: Mortality pattern in different age group of Tharparkar males

Age groups	No. of males available	Total died	Respiratory problem	Enteritis (gastroenteritis)	General debility	Miscellaneous
0-1 months	154	16 (10.39)	4 (2.60)	2 (1.30)	6 (3.90)	4 (2.60)
>1-2 months	129	5 (3.88)	0	1 (0.78)	4 (3.10)	0
>2-3 months	112	0	0	0	0	0
>3-6 months	101	6 (5.94)	1 (0.99)	1 (0.99)	1 (0.99)	3 (2.97)
>6-18 months	66	5 (7.58)	1 (1.52)	0	2 (3.03)	2 (3.03)
>18 months-3 years	39	1 (2.56)	0	0	1 (3.33)	0
>3 years	30	0	0	0	0	0
Overall died		33 (21.43)	6 (3.90)	4 (2.60)	14 (9.09)	9 (5.84)

Values in parentheses indicate percentage, Miscellaneous: Trypanosomiasis, circulatory problem, hepatitis, toxaemia

Table 4: Culling pattern in different age group of Tharparkar males reserved for breeding

Age groups (years)	No. of males available	Total culled	Surplus	Poor growth	Hind leg fracture	Poor libido
<1.5	35	2 (5.71)	2 (5.71)	0	0	0
>1.5-3	26	3 (11.54)	2 (7.69)	1 (3.85)	0	0
>3-5	22	4 (18.18)	3 (13.64)	0	1 (4.55)	0
>5	18	8 (44.44)	7 (37.69)	0	0	1 (3.85)
Overall (%)		17 (48.57)	14 (40.00)	1 (2.86)	1 (2.86)	1 (2.86)

Values in parentheses indicates percentage

(3.90%), enteritis/gastroenteritis (2.60%) and miscellaneous (trypanosomiasis, circulatory problem, hepatitis and toxaemia) (5.84%) in different age group of TP males. Study revealed that there was no mortality in TP males in the age group of 3-5 years males.

The average 305 days milk yield of dams of TP bulls which were born during the period (1997-2012), reserved and which gave freezable semen averaged 1859.50±144.9349, 2149±188.2241 and 2375.71±262.2057 kg, respectively. These results reflect that culling of the TP males in the farm is in scientific line and more stringent with respect to better productivity of the Tharparkar animals. Present study revealed that, overall culling in the different age group of TP reserved males (Table 4) was mainly due to surplus (40.00%). Other reasons like poor growth, hind leg fracture and poor libido also contribute to the culling of TP reserved males with the same values each i.e., 2.86%.

DISCUSSION

High mortality rate in young born males may be due to under developed thermoregulatory as well as immunophysiology systems leading to heat stress and diseases susceptibility when they were exposed to inclement weather and other unhygienic farm conditions[15] Shivahre *et al.*[16] reported high mortality and culling rate in 0-2 and >6 months age groups of Murrah buffalo males respectively. Bangar *et al.*[17] reported overall mortality rate to be 16.81, 1.46 and 0.76% in <1, 1-3 and >3 years age groups cattle, respectively. Pradhan and Panda[18] observed high mortality in 0-3 months in Murrah buffalo calves while, Singh *et al.*[19] reported higher mortality in 0-6 months age group for crossbred calves. Chaudhary *et al.*[20] conducted a study for a period of one year on mortality rates of bovine in Himachal Pradesh and reported that calves show highest mortality of 21.53% followed by young stocks 9.35 and adults 4.73%.

The maximum and minimum disposal rate in P3 and P2, respectively in our present study may be due to management differences. Similar studies on disposal rate of Karan Fries males in an organised herd of NDRI, Karnal was reported by Panmei *et al.*[21] where it was observed that maximum disposal rate was found in P2 born males (28.60%) while minimum in P4 (19.25%). The overall disposal rate in P4 period for the age groups 18 months to 3 years and 3-5 years were not calculated as many of the bulls born during the particular period may not have reached yet the age of disposal. High disposal in rainy season born males may be due to insufficient quantity of good quality leguminous fodder in the subsequent months which may later on affect their health regarding growth and development at later stage. Across different seasons of birth, Panmei *et al.*[21] reported that overall disposal rates was maximum (38.39%) in winter born males and minimum (14.05%) in autumn born Karan Fries males while Shivahre *et al.*[16] reported higher overall disposal rate in rainy (38.48%) and lower in winter (13.07) season born Murrah buffalo calves. Overall, from results, it is revealed that further improvement in standard management of the farm is needed.

In a study conducted by Prasad *et al.*[22] in dairy cattle in NDRI herd, Haryana, it was found that that digestive problems and respiratory disorders together accounted for 70-0% of total deaths. Several researchers reported that general debility in Karan Fries males[7] pneumonia and enteritis in 1-3 months group[23] and respiratory diseases in 0-1 months group cattle[24]

were the main cause of mortality. The various cause of death may be due to unhealthy condition, lack of exercise and insufficient food, etc. and therefore indicated the need of better management which may in turn lead to prevention of stress, boost immunity and resistant to infections. Scanty records are available related to mortality for TP males in the age group of >3 years since less number of bulls are kept after they fulfil to donate the required number of semen dose.

Maximum culling due to surplus in present study depict that the bulls were disposed off from the herd after harvesting required number of frozen semen doses as per mandate of the institute. Percentage of disposal due to surplus in present study was higher than the findings of Rao *et al.*[13] and Suryaprakasam and Rao[25] in crossbred bulls. Among the reserved breeding bulls, disposal due to poor libido were lower compared with the finding reported by Mukhopadhyay *et al.*[26] in Sahiwal and Murrah and Khatun *et al.*[27] in Holstein-Friesian crossbred cattle and Murrah buffalo bulls.

CONCLUSION

In conclusion, proper knowledge of the disposal pattern in the herd, less involuntary culling and planned breeding programme are important for sustaining the Tharparkar population which are of valuable genetic resources. Decrease in disposal rate can be achieved in both the younger and adult age group, by giving more attention and efforts in different fields of management for multiplication and production of more elite bulls.

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