Herd Structure of Kankrej Cattle at Cattle Breeding Farm

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Abstract

An analysis was performed to study the herd structure of Kankrej cattle at Cattle Breeding Farm of Gujarat State. The data were collected from Cattle Breeding Farm, Thara (Gujarat). Data were collected from Livestock records from January 2003 to December 2013. The herd strength ranged between 118.00 to 195.67.00 with a mean of 149.02 ± 08.38 units. The average herd composition includes cow, heifer (above two year), heifer (1-2 year), heifer calf, male (above two year), male (1-2 year), male calf, breeding bull and bullock/teaser was 71.00 ± 4.19, 33.70 ± 2.54, 06.12 ± 0.49, 04.93 ± 0.18, 07.61 ± 1.51, 05.39 ± 1.11, 05.21 ± 0.67, 06.32 ± 0.61 and 08.73 ± 2.80 units, respectively. The average proportion of animals against respective categories was 47.65, 22.61, 04.11, 03.31, 03.62, 03.50, 04.24, 05.11 and 05.86 per cent. Female: male ratio was found to be 71: 29.

Keywords: Herd structure; Kankrej; LRS.

Introduction

Management decision related to the composition of cattle on the farm has impact on the long-term profitability. Herd strength is one of the important factors affecting milk production, labour management and overall economy of the farm. Culling decisions are important part for management of herd composition. Increase in herd strength through productive animals (Milking cows) and breedable heifers is likely to increase total milk production of herd; whereas, uncontrolled increase in non-productive animals (dry animals, male calves and females with inferior growth) in the herd directly leads to additional burden to available resources like housing, feeds and fodders and thereby reduce the profitability and efficiency of the farm. Therefore, the herd strength of the organized farm has been evaluated in terms of total strength and compositions of herd structure in accordance to total herd strength over a period of eleven years.

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Material and Methods

The data for this study were collected over the period from January-2003 to December-2013, from Cattle Breeding Farm, Thara, District-Banaskantha, and State- Gujarat. The average strength of the different classes of the herd, viz., cows, heifers, female calves, male calves, breeding bulls, bullocks/ teasers excluding those disposed were compiled from the herd roll-call registers for every month of respective years of study. Finally average annual strength of the respective classes was calculated for all the years. Adult units for each year were worked out on the basis of criteria (Table 1) described by Burte (1995). Data collected were analyzed by frequency, mean and per cent basis as.

Results and Discussion

Information furnished in Table 2 and 3 denotes the details of herd strength of different categories of animals in terms of adult unit and head basis, respectively for Kankrej cattle at Cattle Breeding Farm, Thara (Gujarat).

It is visualized from the Table 2 that the average number of cows, heifers (above 2 years to upto calving), heifers (1-2 year), heifer calves, males (above 2 years to upto breeding), males (1-2 year, including growing bull and castrated male), male calves, breeding bulls and bullock/teaser units were ranged from 54.00 to 95.00, 22.67 to 50.00, 03.33 to 9.67, 04.25 to 06.00. 01.25 to 15.00, 00.67 to 12.00, 01.67 to 09.99, 03.00 to 10.00 and 2.00 to 31.00 units, respectively with mean values 71.00 ± 4.19, 33.70 ± 2.54, 06.12 ± 0.49, 04.93 ± 0.18, 07.61 ± 1.51, 05.39 ±

Table 1: Criteria for estimating Adult units (Burte, 1995)

4 Calves (below 1 yr.)	=	1 A. U.
3 Heifers & growing bulls (above 1 to 2 yr.)	=	1 A.U.
1.5 Above 2 yrs to up to calving / breeding	=	1 A.U.
1 Cow	=	1 A. U.
1 Breeding Bull	=	1.25 A. U.
1 Bullock	=	1 A. U.
1 Teaser	=	1 A. U.

Table 2: Average composition and strength of Kankrej cows (on adult unit basis) at CBF-Thara

Year	Cows	Heifers above 2 yrs. upto calving	Heifers 1-2 yr.	Heifer calves	Male above 2 yrs. upto breeding.	Male 1-2 yr.	Male calves	Breeding Bulls	Bullocks / Teaser	Total
2003	93.00 (47.53)	50.00 (25.55)	9.67 (4.94)	5.00 (2.56)	10.00 (5.11)	9.00 (4.60)	9.00 (4.60)	5.00 (2.56)	5.00 (2.56)	195.67
2004	95.00 (48.91)	46.67 (24.02)	5.67 (2.92)	6.00 (3.09)	6.67 (3.43)	8.00 (4.12)	10.00 (5.15)	11.25 (5.79)	5.00 (2.57)	194.25
2005	77.00 (47.93)	34.00 (21.16)	6.33 (3.94)	5.75 (3.58)	7.33 (4.56)	5.00 (3.11)	7.75 (4.82)	12.50 (7.78)	5.00 (3.11)	160.67
2006	65.00 (48.60)	30.00 (22.43)	6.33 (4.74)	4.50 (3.36)	2.67 (1.99)	3.00 (2.24)	7.00 (5.23)	6.25 (4.67)	9.00 (6.73)	133.75
2007	70.00 (44.54)	33.33 (21.21)	5.00 (3.18)	5.00 (3.18)	2.00 (1.27)	4.33 (2.76)	5.25 (3.34)	1.25 (0.80)	31.00 (19.72)	157.17
2008	73.00 (44.81)	34.00 (20.87)	5.67 (3.48)	4.25 (2.61)	2.00 (1.23)	5.00 (3.07)	5.25 (3.22)	13.75 (8.44)	20.00 (12.28)	162.92
2009	54.00 (37.72)	35.33 (24.68)	5.67 (3.96)	5.00 (3.49)	7.33 (5.12)	3.33 (2.33)	4.50 (3.14)	15.00 (10.48)	13.00 (9.08)	143.17
2010	54.00 (44.54)	33.33 (27.49)	7.33 (6.05)	4.25 (3.51)	2.67 (2.20)	4.67 (3.85)	3.00 (2.47)	10.00 (8.25)	2.00 (1.65)	121.25
2011	62.00 (52.54)	27.33 (23.16)	5.00 (4.24)	5.50 (4.66)	6.00 (5.08)	1.67 (1.41)	6.00 (5.08)	2.50 (2.12)	2.00 (1.69)	118.00
2012	77.00 (58.33)	24.00 (18.18)	7.33 (5.56)	4.50 (3.41)	0.67 (0.51)	7.00 (5.30)	5.75 (4.36)	3.75 (2.84)	2.00 (1.52)	132.00
2013	61.00 (50.69)	22.67 (18.84)	3.33 (2.77)	4.50 (3.74)	12.00 (9.97)	6.33 (5.26)	6.00 (4.99)	2.50 (2.08)	2.00 (1.66)	120.33
Mean ± S. E.	71.00 ± 04.19	33.70 ± 02.54	6.12 ± 00.49	4.93 ± 00.18	5.39 ± 01.11	5.21 ± 00.67	6.32 ± 00.61	7.61 ± 01.51	8.73 ± 02.80	149.02 ± 08.38
Overall	(47.65)	(22.61)	(4.11)	(3.31)	(3.62)	(3.50)	(4.24)	(5.11)	(5.86)	(100.00)

Figures in parenthesis indicate per cent.

1.11, 05.21 ± 0.67, 06.32 ± 0.61 and 08.73 ± 2.80 units, respectively over the period of 2003 to 2013.

Trend of change in strength of cow and heifer (above one year) units corresponds the trend of average herd strength. The overall average proportion of different categories of animals like cow, heifer (above 2 year to upto calving), heifer (1-2 year), heifer calf, male (above 2 year to upto breeding), male (1-2 year, including growing bull and castrated male), male calf, breeding bull and bullock/teaser was 47.65, 22.61, 04.11, 03.31, 03.62, 03.50, 04.24, 05.11 and 05.86 per cent, respectively. The mean value for the average herd strength in terms of adult unit was 149.02 ± 08.38 for the period under study. It was found that the mean herd strength at CBF, Thara (149.02 A. U.) was lower than the findings of Bettini et al. (1962); Patel (1971) for Anand (178.09) and Charodi farm (282.45); Chaudhary (1999) and Ankuya (2017).

Proportion of all categories of Kankrej animals decreased gradually till 2013. This was might be due to lack of facilities, lack of managerial (administrative and technical) staff forcing them to increase culling rate.

Proportion of cows and heifers above 2 years of age was higher in 2003 and 2004, but thereafter it was maintained with mean value throughout study period. In the male line, proportion of male of 1 to 2 year of age and male calves were maintained throughout study period. But proportion of male above 2 year of age and breeding bull was uneven throughout study period. This was might be due to uneven culling based on requirement of growing and breeding bulls by the institute or farmers. Proportion of bullocks was also reduced to lower numbers might be due to reduction in total numbers of Kankrej herd which need lower quantum of fodder for feeding.

Average composition of Kankrej herd for different categories of animals on head basis is presented in Table 3. The herd strength ranged between 182.00 to 304.00 with a mean value 223.45 ± 12.63 over the period under study. The cows contributed the highest (31.77%) of herd strength and followed by heifers (above two year), male calves, heifer calves, heifers (1-2 year), males (1-2 years), bullocks/teasers, male (above two year) and breeding bulls with 22.62, 11.31, 08.83, 08.22, 07.00, 03.91, 03.62 and 02.73 per cent of the herd strength, respectively.

Proportion of heifers above two year of age was quite higher than heifers of 1-2 years age and

Table 3: Average composition and strength of Kankrej cows (on head unit basis) at CBF-Thara

Year	Cows	Heifers above 2 yrs. upto calving	Heifers 1-2 yr.	Heifer calves	Male above 2 yrs. upto breeding.	Male 1-2 yr.	Male calves	Breeding Bulls	Bullocks/ Teaser	Total
2003	93 (30.59)	75 (24.67)	29 (9.54)	20 (6.58)	15 (4.93)	27 (8.88)	36 (11.84)	04 (1.32)	05 (1.64)	304
2004	95 (32.31)	70 (23.81)	17 (5.78)	24 (8.16)	10 (3.40)	24 (8.16)	40 (13.61)	09 (3.06)	05 (1.70)	294
2005	77 (31.82)	51 (21.07)	19 (7.85)	23 (9.50)	11 (4.55)	15 (6.20)	31 (12.81)	10 (4.13)	05 (2.07)	242
2006	65 (32.18)	45 (22.28)	19 (9.41)	18 (8.91)	04 (1.98)	09 (4.46)	28 (13.86)	05 (2.48)	09 (4.46)	202
2007	70 (31.25)	50 (22.32)	15 (6.70)	20 (8.93)	03 (1.34)	13 (5.80)	21 (9.38)	01 (0.45)	31 (13.84)	224
2008	73 (32.02)	51 (22.37)	17 (7.46)	17 (7.46)	03 (1.32)	15 (6.58)	21 (9.21)	11 (4.82)	20 (8.77)	228
2009	54 (25.96)	53 (25.48)	17 (8.17)	20 (9.62)	11 (5.29)	10 (4.81)	18 (8.65)	12 (5.77)	13 (6.25)	208
2010	54 (29.51)	50 (27.32)	22 (12.02)	17 (9.29)	04 (2.19)	14 (7.65)	12 (6.56)	08 (4.37)	02 (1.09)	183
2011	62 (34.07)	41 (22.53)	15 (8.24)	22 (12.09)	09 (4.95)	05 (2.75)	24 (13.19)	02 (1.10)	02 (1.10)	182
2012	77 (37.93)	36 (17.73)	22 (10.84)	18 (8.87)	01 (0.49)	21 (10.34)	23 (11.33)	03 (1.48)	02 (0.99)	203
2013	61 (32.45)	34 (18.09)	10 (5.32)	18 (9.57)	18 (9.57)	19 (10.11)	24 (12.77)	02 (1.06)	02 (1.06)	188
Mean ± S. E.	71.00 ± 4.19	50.55 ± 3.80	18.36 ± 1.47	19.73 ± 0.73	8.09 ± 1.66	15.64 ± 2.00	25.27 ± 2.42	6.09 ± 1.21	8.73 ± 2.80	223.45 ± 12.63
Overall	(31.77)	(22.62)	(8.22)	(8.83)	(3.62)	(7.00)	(11.31)	(2.73)	(3.91)	(100.00)

Figures in parenthesis indicate per cent.

heifer calves. This was might be due to inclusion of heifers of 3 years and above age and that too due to late maturity of indigenous cattle. The age of first calving is more than 1000 days in Kankrej cattle. The present findings are in agreement with the results of Burte (1995) and Chaudhary (1999) with slight lower values of the herd strength. Proportion of heifers above two years occupies second position next to cows. As they are the second lines of herd going to occupy first line of cows in the future as replacement stock.

It was also seen from the Table 3 that the proportion of male above one year upto breeding (10.62%), was higher than heifer calves (8.83%). This might be due to the reason that, older males might have been retained for distribution to for breeding purpose.

Proportion of female and male was 71: 29 at CBF, Thara (Table 4). Proportion of male was higher than the herd of China cattle (Matassino *et al.* 1965) and Kankrej herd of Anand (Tripathi, 1970).

Proportion of cows (31.71%) as compared to other category of female followers was higher at Cattle Breeding Farm. The result was similar to Burte (1995). However, proportion of heifers above 2 years of age (22.67%) was higher at CBF as compared to the findings of Ankuya (2016) for CBF, Bhuj and Ankuya (2017) for LRS, Sardarkrushinagar. This was might be due to more longevity of cows and restriction of herd strength as well as better replacement rate from heifers to cow. Proportion of cows to the total herd strength at CBF was lower than the findings of Tripathi (1970) and similar to the findings of Ankuya (2016). Proportion of heifers (1–2 yrs.) at CBF were higher as compared to the

findings of Ankuya (2016) for CBF, Bhuj and lower than Ankuya (2017) for LRS, Sardarkrushinagar.

Proportion of heifer calves (8.83%) was lower than the findings of Ankuya (2017) for LRS, Sardarkrushinagar (12.13%) and CBF, Bhuj (10.19%) Ankuya (2016). This was might be due to more mortality in younger calves.

Male above 2 years to breeding was much lower than the finding of Ankuya (2017) for CBF, Bhuj and slightly lower than LRS, Sardarkrushinagar. This is attributed to the cause of selling older indigenous male calves for distribution to district and village panchayats for breeding.

Proportion of male (1-2 years) and male calves was more or similar at all three stations. Proportion of bullock was higher than the finding of Ankuya (2017) for LRS, Sardarkrushinagar and CBF, Bhuj might be due to more irrigated land for fodder production and less mechanization as compared to LRS, Sardarkrushinagar.

Proportion of cows at CBF was lower than the findings of earlier workers (Bettini *et al.* 1962, Quadri and Proto, 1964, Matassino *et al.* 1965 and Nowicki and Jaczewski, 1974). However, proportion of female calves was more or less similar at CBF, Thara as compared to the findings of Bettini *et al.* (1962); whereas, proportion of female calves was higher at LRS as compared to findings of earlier workers (Quadri and Proto, 1964 and Matassino *et al.* 1965).

Proportion of cows (44.78%) in female stock was higher than other category of animals followed by heifers above 2 years of age (31.66%) whereas, strength of male calves (39.60%) was higher in male department (Table 5).

Table 4: Comparison of overall composition of the herd (per cent) on the head basis of total herd strength

Sr. No.	Name of farm	Cows	Heifers above 2 yrs. upto calving	Heifers 1-2 Year	Heifer calves	Total female	Male above 2 yrs. upto breeding	Male 1-2 years	Male calves	Breeding Bulls	Bullocks / Teaser	Total male	Reference
1.	CBF-Thara	31.77	22.62	8.22	8.83	71.44	3.62	7.00	11.31	2.73	3.91	28.56	
2.	LRS-SKN	32.34	15.37	10.89	12.13	70.73	4.25	7.46	12.33	2.88	2.35	29.27	Ankuya (2017)
3.	CBF-Bhuj	30.82	20.68	7.82	10.19	69.51	9.01	8.37	11.67	0.42	1.01	30.49	

Table 5: Comparison of overall composition of Female / Male population (per cent) of the herd on the head basis

Sr. No.	Name of farm	Cows	Heifers above 2 yrs. upto calving	Heifers 1-2 Years	Heifer calves	Total female	Male above 2 yrs. upto breeding	Male 1-2 years	Male calves	Breeding Bulls	Bullocks / Teaser	Total male	Reference
1.	CBF-Thara	44.48	31.66	11.50	12.36	100.00	12.68	24.50	39.60	9.54	13.68	100.00	
2.	LRS-SKN	45.72	21.73	15.40	17.15	100.00	14.53	25.47	42.12	9.83	8.04	100.00	Ankuya (2017)
3.	CBF-Bhuj	44.34	29.74	11.25	14.66	100.00	29.54	27.46	38.28	1.39	3.33	100.00	

Conclusions

Based on results, it can be concluded that the composition of herd structure at CBF, Thara is in a balanced manner i.e. the different category of animals in particular cows, heifers for replacement stock and breeding bull is ideal. However, there was declining trend for total herd strength during the period under study.

References

1. Ankuya, K.J. Culling and disposal of Kankrej cattle in Gujarat state. Ph. D. Thesis for Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. 2016.

2. Ankuya, K. J., Prajapati, K. B. and Joshi A. Herd structure at an organized farm. *Life Science leaflets,* 2017;2277-429:25-30.

3. Bettini, T.M.; Matassino, D. and Maffini, P. An investigation on the structure of a large dairy farm and on the dynamics of its numerical equilibrium with reference to factors influencing mortality and disposals at various stages. (Cited. Animal Breeding Abstract. 1962;32:141).

4. Burte, R.G. An analysis of herd structure, herd performance and labour utilization pattern in Kankrej and crossbred herds. Ph.D. Thesis. Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. 1995.

5. Chaudhary, P.R. Culling and disposal of cattle in Gujarat state. M. V. sc. Thesis for Gujarat Agricultural University. 1999.

6. Matassino, D.; Liberotti, G. and Gatti, L. Demographic aspects of a herd of China cattle. *Produz. Animo,* 1965;4:333-378. (Cited. Animal Breeding Abstracts 34:2798.pp.482).

7. Nowicki, B. and Jaczewski, S. Effect of herd structure on breeding progress and productivity. *Zootechnika*, 1974;17:31-45. (Cited. Anim. Breed. Abstr. 42(2) 581. pp.62).

8. Patel, J.P. Causes of disposal of Kankrej cattle. M. Sc. (Agri.) Thesis. Institute of Agriculture, Anand. 1971.

9. Quadri, G. and Proto, V. An investigation of the structure and dynamic characteristics of large dairy farms in Northern Italy. (Cited. Animal Breeding Abstract. 1964;32(1):295.

10. Tripathi, M. Study on some aspects of dairy cattle management. M. Sc. Thesis, Sardar Patel University. 1970.