Haryana Vet. (June, 2016) **55 (1)**, 31-36

Research Article

KNOWLEDGE OF DAIRY FARMERS ABOUT ANIMAL WELFARE IN HARYANA: A PATH ANALYSIS

SARITA, S.P. SINGH*, S.S. SANGWAN, GAUTAM and MONIKA SHARMA
Department of Veterinary and Animal Husbandry Extension Education
College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences
Hisar-125 004, India

Received: 08.09.2015, Accepted: 16.02.2016

ABSTRACT

The present study was conducted on 120 dairy farmers randomly selected from four villages of Hisar district, Haryana to explore their knowledge level about animal welfare legislation. A knowledge schedule based on Prevention of Cruelty to Animals Act (1960) was developed. The results revealed that majority of the respondents had low to medium level of knowledge about animal welfare laws. Maximum knowledge (95%) was possessed by the dairy farmers about 'Act of performing mutilation on any animal is banned in our country' followed by 'The amount of fine is different in 1st and subsequent offences' (92%) whereas minimum knowledge (50.5%) was possessed by the farmers about 'It is punishable to keep any animal chained or tethered upon an unreasonably soft or unreasonably heavy chain or cord for an unreasonable time under this act (50.5%) and Prevention of Cruelty to Animals Act (1960) extends to the whole of the country except the state of J&K (50.5%). The correlation equation between dependent and independent variables further indicated that educational qualification, extension contact and mass media exposure of dairy farmers had positive and significant relationship with knowledge of dairy farmers regarding animal welfare laws. All the nine independent variables had jointly explained about 60 to 70% variation towards knowledge of dairy farmers of different categories. The overall analysis revealed that social participation and mass media exposure had positive and direct effect on knowledge of the respondents.

Key words: Animal, dairy farmers, economic motivation, knowledge level, welfare law

The last three decades has witnessed a dramatic increase in society's interest in the welfare of farm and other domesticated animals (Fraser, 2001; Levy, 2004) with the welfare of farm animals high on the political and societal agendas. Next to widespread public concerns about animal welfare (Serpell, 1999; Mejdell, 2006) its importance is acknowledged by all stakeholders along the animal production chain (Bracke *et al*., 2005).

Research on farmer's traditions of conceptualizing animal welfare has been lacking until relatively recently (Velde *et al*., 2002; Lund *et al*., 2004; Austin *et al*., 2005; Lassen *et al*., 2006; Bock and van Huik, 2007). It is debatable whether farmers, consumers and other stakeholders are talking about the same issue when discussing improving animal welfare. Understanding how different actors perceive animal welfare is a precondition for the successful improvement of welfare (Kauppinen *et al*., 2010). Therefore, the objective of this study was to gauze the farmers' awareness animal welfare laws.

MATERIALS AND METHODS

The study was conducted in Hisar district of Haryana state keeping in view the fact that the district has the highest livestock population. Of the nine administrative blocks of this district, two blocks (Adampur and Hisar-II) were selected by simple random sampling technique. Two villages were then randomly chosen from each of the two blocks using simple lottery method. Thus, a total of four villages were selected. Dairy farmers (n=30) were selected randomly from each village as respondents for the study. Therefore, the total sample size was 120 dairy farmers from four villages. Independent variables namely age, education, family size, family type, land holding, social participation, extension contact, mass media exposure and economic motivation were also included in this study.

Knowledge in the present study was documented as the amount of understood information possessed by the dairy farmers regarding animal welfare laws and assessed with the help of a schedule. The schedule was developed; the contents included the prevailing animal welfare laws in the country. A list of statements was prepared with the help of animal welfare laws with main focus on Prevention of Cruelty to Animals Act (1960). Initially a total of 40 statements were collected and subjected to critical analysis by the scientists and the researchers using the criterion suggested by Edwards and Kilpatrick (1948). Based on this, 17 statements were discarded and 23 statements were retained. The

Corresponding author: spsingh.vet@gmail.com

respondents were requested to give their responses on dichotomous form i.e. correct and incorrect answer and the weightage of 2 and 1 were given, respectively. The overall knowledge score for each respondent was then calculated by adding up the scores obtained per statement. The total minimum and maximum possible scores were 23 and 46, respectively. But the total minimum and maximum scores obtained by dairy farmers were 25 and 42, respectively. On the basis of the total score obtained by the respondents, they were categorised into three categories of knowledge level i.e. low, medium and high using the mean and half standard deviation formula.

RESULTS AND DISCUSSION

Knowledge Level of Dairy Farmers about Animal Welfare Laws: 42.86% of the dairy farmers in small herd category possessed low level of knowledge followed by 32.65% in medium and 24.49% in high level of knowledge about animal welfare laws (Table 1). Likewise, in medium herd category, 36.73% of dairy farmers had medium level of knowledge regarding animal welfare laws. However, in the large herd size, 45.45% of respondents each had medium and high level of knowledge about animal welfare laws.

Overall, 31.67% dairy farmers were found in each low and high knowledge level whereas 36.66% of them were having medium knowledge level regarding animal welfare laws. Mean knowledge score of 120 dairy farmers was found to be 33 out of 42. Hence about one - third of the respondents possessed low level of knowledge about animal welfare laws. This may be due to the fact that animal welfare is a new topic and farmers are less aware of animal welfare laws. It is a fact that the dairy farmers have sufficient knowledge about animal husbandry practices as reported by Raval and Chandawat (2011). Field functionaries should launch campaign to educate the farmers about the animal welfare laws so that the level of awareness may be increased.

Statement-wise Knowledge Level of Dairy Farmers about Animal Welfare Laws: The data in Table 2 revealed that the farmers had highest knowledge mean per cent score i.e. 94.5% for 'Act of performing mutilation on any animal is banned in our country' and hence ranked first. The respondents also possessed 92% knowledge about 'The amount of fine is different in 1st and subsequent offences' followed by 89% knowledge about 'Any person who conveys or carries any animal whether in or upon any vehicle in such a manner or position as to subject it to unnecessary pain or suffering is punishable by law'..

Table 1
Classification of dairy farmers on the basis of knowledge scores obtained about animal welfare laws

Knowledge level	Frequency (%)			Overall frequency(%)
	Small farmers	Medium farmers	Large farmers	
Low (25- 30)	21 (42.86)	15 (30.62)	2 (9.10)	38 (31.67)
Medium (31-36)	16 (32.65)	18 (36.73)	10 (45.45)	44 (36.66)
High (37-42)	12 (24.49)	16(32.65)	10 (45.45)	38(31.67)

Mean=33.31+0.3948; SD=4.32

Further the analysis revealed that overall dairy farmers had comparatively low knowledge about a few statements (Table 2). Overall, the knowledge level of dairy farmers varied from 95 to 50% about various aspects of animal welfare laws. The overall analysis also revealed that slight variation in knowledge level was found in each statement of animal welfare law as compared to category-wise analysis of dairy farmers.

Relationship between Personal Trait of Dairy Farmers and their Knowledge about Animal Welfare Laws: Educational qualification, social participation, extension contact and mass media exposure were found to have positive and significant correlation with knowledge of farmers in all the three herd categories (Table 3). However, in case of medium herd size category, type of family also had positive and significant relationship with knowledge level of farmers.

Overall educational qualification, type of family, social participation, extension contact and mass media exposure exhibited positive and significant correlation with the knowledge level about animal welfare laws. The positive correlation of education indicated that educated farmers possessed more knowledge as compared to less educated farmers probably due to easy access to various sources like magazine, journals, news papers etc. Arora *et al.* (2006), Sharma and Singh (2008) and Sharma *et al.* (2009) in their study also reported positive correlation between education and knowledge level of dairy farmers.

More mass media exposure and extension contact hereby means more exposure to the various information and interactions with various crucial and critical informants of dairy farming and hence, it may have attributed to the gain in knowledge about animal welfare laws. Arora *et al.* (2006), Sharma and Singh (2008), Meena *et al*. (2009) and Sharma *et al.* (2009) also reported positive and highly significant relationship of mass media exposure and extension contact with knowledge level of dairy farmers. Meena *et al.* (2012) reported positive and significant correlation between extension contact and knowledge. In the present study, type of family was also found to have

Table 2

Statement-wise knowledge level of dairy farmers of large herd size about animal welfare laws (n=120)

Statements	Correct (2)		Incorrect (1)		Total score	Mean score	Mean percent score	Rank order
	F	%	F	%				
1. PCA, Act (1960) extends to the whole of the country except the state of J & K.	0	0	22	100.00	44	1.00	50.0	22.5
2. It is punishable to inject any drug to improve lactation which is injurious to the health of animal.	17	77.29	05	22.73	39	1.77	88.5	05.0
3. It is offence to abandon any animal without any reasonable cause in circumstances which render it likely that it will suffer pain by reason of starvation or thirst.	13	59.09	09	40.91	35	1.59	79.5	11.5
4. Act of performing mutilation on any animal is banned in our country.	22	100.00	0	0	44	2	100	01.0
5. It is punishable to administer any injurious drug or substance wilfully and unreasonably to any animal by law.	16	72.73	06	27.27	38	1.73	86.5	07.0
6. It is punishable to offer for sale any animal in his possession which is suffering pain by reason of mutilation, overcrowding or other ill-treatment.	08	36.36	14	63.64	30	1.36	68.0	15.5
7. It is offence to permit any diseased or disabled animal of which he is owner to die in any street without reasonable excuse.	17	77.27	05	22.73	39	1.77	88.5	05.0
8. Any person who beats, kicks, over-rides, over-drives, over-loads, tortures or otherwise treats any animal so as to subject it to unnecessary pain or suffering is punishable under this act.	19	86.36	03	13.64	41	1.86	93.0	02.5
9. It is punishable to keep any animal chained or tethered upon an unreasonably soft or unreasonably heavy chain or cord for an unreasonable time under this act.	01	04.55	21	95.45	23	1.05	52.5	21.0
10. It is punishable to employ any animal having wound or sore in any work.	15	68.18	07	31.82	37	1.68	84.0	08.0
11. No person can transport an animal on foot before sunrises or after sunsets	02	09.09	20	90.91	24	1.09	54.5	20.0
12. No person shall continue to keep or cause to be kept in harness any animal used for the purpose of drawing vehicles after it is no longer needed for such purpose.	14	63.64	08	36.36	36	1.64	82.0	09.5
13. No person shall use or cause to be used any animal for drawing any vehicle or carrying any load for more than 5 hrs continuously without a break for rest for the animal.	14	63.64	08	36.36	36	1.64	82.0	09.5
14. If a person carries any animal in or upon any vehicle in a manner/position as to subject it to unnecessary pain or suffering is punishable by law.	0	0	22	100.00	44	1.00	50.0	22.5
15. No person shall use any spiked stick or any other sharp equipment which causes severe pain to the animal for the purpose of driving or riding an animal.	12	54.55	10	45.45	34	1.55	77.5	13.5
16. It is punishable if any person incites any animal to fight or bait any other animal solely with a view to provide entertainment.	08	36.36	14	63.64	30	1.36	68.0	15.5
17. The amount of fine is different in 1st and subsequent offences.	19	86.36	03	13.64	41	1.86	93.0	2.5
18. Maximum no. of passengers for animal driven vehicles should not be more than four persons excluding driver and children below 6 years of age.	12	54.55	10	45.45	34	1.55	77.5	13.5
19. Medium bullock or medium buffalo respectively means a bullock or buffalo, the weight of which is > 250 kgs but < 350 kgs.	17	77.27	05	22.73	39	1.77	88.5	05.0
20. The punishment of performing phooka include fine which may extend to 1000 Rs, imprisonment for a term which may extend to 2 yrs or both.	13	59.09	09	40.91	35	1.59	79.5	11.5
21. A certificate of a veterinarian doctor in respect of each animal to be transported shall accompany such animal.	04	18.18	18	81.82	26	1.18	59.0	19.0
22. There should be a period of rest for cows and buffaloes at every 4 hrs for feeding.	05	22.73	17	77.27	27	1.23	61.5	17.5
23. A period of rest for cows and buffaloes for drinking should be at every 2 hours.	05	22.73	17	77.27	27	1.23	61.5	17.5

Table 3
Correlation between personal attributes and knowledge level of dairy farmers about animal welfare laws

Independent variables	Category of respondents and r-value			
	Small (n=49)	Medium (n=49)	Large (n=22)	Overall (n=120)
Age (X_1)	-0.076	-0.002	-0.024	-0.021
Educational qualification (X_2)	0.272*	0.299*	0.429**	0.235**
Family size (X_3)	0.033	0.166	0.245	0.120
Type of family (X_4)	0.142	0.329**	0.282	0.224*
Land holding (X_5)	0.092	0.096	0.156	0.051
Social participation (X_6)	0.268*	0.337**	0.476**	0.224*
Extension contact (X_7)	0.257*	0.265*	0.262*	0.195*
Mass media exposure (X_8)	0.342**	0.349**	0.438**	0.199*
Economic motivation (X_9)	0.051	0.160	0.102	0.069

*P<0.05; **P<0.01

positive and significant effect on the knowledge of the dairy farmers about animal welfare laws in the overall analysis as well as in medium category of dairy farmers which might be due to the fact that medium farmers have more time and interest in other supplementary occupation as compared to the small and large category of dairy farmers. Social participation too had a significant and positive relationship with knowledge level which revealed that frequent discussion, interaction; meetings etc. with scientists, experts and extension personnel might enhance their knowledge level.

Contribution of Personal Attributes towards Knowledge Level of the Dairy Farmers regarding Animal Welfare (Regression Analysis): In small herd category of dairy farmers, four (educational qualification, social participation, extension contact and mass media exposure of the nine variables had exhibited significant value of 't' for 'b' ($P \leq 0.05$; Table 4). The R^2 (Determinant of coefficient) value revealed that all the nine variables have explained 60.77% of variation regarding farmer's knowledge about animal welfare laws in small herd category. Similar results were obtained in case of medium herd category of dairy farmers. The value of coefficient determination (R^2=0.6232) in medium herd category showed that all the nine variables fitted in the equation together jointly explained 62.32% of variation towards knowledge of the dairy farmers about animal welfare laws. The F-value (4.855) was found to be significant. In large herd category, the regression study revealed that four variables exhibited positive and significant values of partial regression coefficients (Table 4). R^2 value implies that all the variables jointly explained 67.91% of variation regarding the knowledge of dairy farmers about animal welfare which was confirmed by F-value (2.822) significant.

The overall analysis revealed that all the nine antecedent variables had contributed 69.72% of variation toward knowledge of dairy farmers alongwith significant F value while four variables (education, social participation, extension contact and mass media exposure) have positive and significant value of 't' for 'b' ($Pd \leq 0.05$) indicating that these four variables were important to explain the variation towards knowledge of dairy farmers. It also implied that literate farmers having enough education with a reasonable extension contact and mass media exposure coupled with social participation resulted in gaining more knowledge.

Path Analysis: Effect of Personal Attributes on Knowledge of Dairy Farmers: One of the objectives of this analysis was to ascertain the effect of both ways i.e. direct as well as indirect of various variables on knowledge about animal welfare laws. The data presented in Table 5 revealed that in small herd size category, mass media

Table 4
Regression coefficients between personal attributes and knowledge level of dairy farmers regarding animal welfare laws

Independent variables	Small (n=49)		Medium (n=49)		Large (n=22)		Overall (n=120)	
	b-value	t-value	b-value	t-value	b-value	t-value	b-value	t-value
Age (X_1)	-0.043	-0.703	-0.003	-0.049	-0.017	-0.203	-0.014	-0.359
Educational qualification (X_2)	0.343	2.209*	0.307	2.665**	0.707	2.425*	0.087	2.010*
Family size (X_3)	0.193	0.423	0.090	0.246	1.158	3.881	0.142	0.636
Type of family (X_4)	4.142	1.533	2.869	1.542	7.271	3.605	2.803	2.227
Land holding (X_5)	0.401	0.714	0.045	0.088	0.485	1.048	0.062	0.203
Social participation (X_6)	0.099	2.294**	1.984	2.098*	0.692	2.880*	0.823	1.996*
Extension contact (X_7)	0.374	2.958**	0.289	2.732*	0.307	2.529*	0.208	1.866*
Mass media exposure (X_8)	0.806	2.875**	0.448	2.846**	0.134	2.299*	0.291	2.011*
Economic motivation (X_9)	0.211	0.779	0.195	0.580	0.069	0.378	0.024	0.149
R^2 values		0.6077		0.6232		0.6791		0.6972
F-values		4.932*		4.855*		2.822*		20.410*

*P<0.05; **P<0.01

Table 5

Direct, indirect and largest indirect effects of antecedent variables on the knowledge level of dairy farmers about animal welfare laws

Independent variables	Small farmers (n=49)			Medium farmers (n=49)			Large farmers (n=22)			Overall (n=120)		
	Direct effects	Indirect effects	Substantial effects	Direct effects	Indirect effects	Substantial effects	Direct effects	Indirect effects	Substantial effects	Direct effects	Indirect effects	Substantial effects
Age	-0.118	-0.076	0.06465 (X_2)	-0.009	-0.002	0.07271 (X_6)	-0.053	-0.0236	0.25915 (X_2)	-0.039	-0.02072	0.03066 (X_6)
			0.05382 (X_8)			0.07103 (X_2)			0.11649 (X_4)			0.02820 (X_4)
			0.02442 (X_9)			0.01828 (X_7)			0.10982 (X_3)			0.01968 (X_2)
Education	0.149	0.13187	0.17012 (X_8)	0.152	0.04877	0.14364 (X_6)	0.36	0.22893	0.18369 (X_3)	0.04	0.05466	0.06230 (X_6)
			0.05484 (X_4)			0.08376 (X_8)			0.11164 (X_4)			0.05363 (X_8)
			0.05103 (X_1)			0.03747 (X_4)			0.04948 (X_5)			0.01921 (X_1)
Family size	0.078	0.03268	0.17103 (X_4)	0.053	0.16612	0.22171 (X_4)	1.057	0.24509	0.76018 (X_4)	0.084	0.11978	0.20444 (X_4)
			0.07748 (X_8)			0.01920 (X_9)			0.03131 (X_5)			0.00560 (X_1)
			0.03303 (X_5)			0.01665 (X_7)			0.06260 (X_2)			0.00429 (X_8)
Type of family	0.293	0.14207	0.04527 (X_3)	0.323	0.32879	0.03652 (X_3)	1.037	0.28155	0.77472 (X_3)	0.288	0.22374	0.05950 (X_3)
			0.02888 (X_5)			0.02042 (X_9)			0.04081 (X_7)			0.00528 (X_6)
			0.02798 (X_2)			0.01764 (X_2)			0.03877 (X_2)			0.00379 (X_1)
Land holding	0.123	0.09157	0.10400 (X_8)	0.013	0.0961	0.09999 (X_6)	0.196	0.156	0.16868 (X_3)	0.02	0.05123	0.04448 (X_6)
			0.06894 (X_4)			0.03470 (X_2)			0.14688 (X_4)			0.04215 (X_4)
			0.04702 (X_9)			0.02222 (X_4)			0.09084 (X_2)			0.01888 (X_8)
Social participation	0.023	0.01783	0.12582 (X_9)	0.449	0.33655	0.09934 (X_9)	0.191	0.07631	0.20636 (X_4)	0.188	0.12371	0.02629 (X_8)
			0.10873 (X_8)			0.04855 (X_2)			0.06877 (X_7)			0.01317 (X_2)
			0.06777 (X_2)			0.02973 (X_8)			0.06645 (X_3)			0.01186 (X_9)
Extension contact	0.15	0.23703	0.12975 (X_8)	0.122	0.0919	0.04199 (X_2)	0.134	0.16201	0.31548 (X_4)	0.083	0.12423	0.02942 (X_8)
			0.03531 (X_4)			0.02685 (X_8)			0.12915 (X_2)			0.01086 (X_6)
			0.01632 (X_2)			0.01728 (X_6)			0.12028 (X_3)			0.00261 (X_5)
Mass media exposure	0.345	0.34247	0.07360 (X_2)	0.16	0.14924	0.08324 (X_6)	0.059	0.23822	0.13611 (X_2)	0.112	0.11367	0.04386 (X_6)
			0.05618 (X_7)			0.07927 (X_2)			0.12263 (X_3)			0.02183 (X_7)
			0.03694 (X_5)			0.02050 (X_7)			0.03133 (X_6)			0.01891 (X_2)
Economic motivation	0.174	0.05142	0.07163 (X_8)	0.132	0.15989	0.33893 (X_6)	0.073	0.10169	0.26486 (X_3)	0.018	0.0687	0.12106 (X_6)
			0.03685 (X_4)			0.05003 (X_4)			0.18482 (X_4)			0.02650 (X_4)
			0.03307 (X_5)			0.02532 (X_2)			0.06161 (X_2)			0.01440 (X_8)

exposure was found the most potent variable affecting the knowledge of farmers positively, as the direct effect of this variable was highest. Indirectly it was exerting its influence through education, extension contact and land holding. This variable was channelized by as many as seven variables in exercising their indirect influence, which indicated its significant role in the improvement of knowledge. It is logical to assume that those farmers who had more mass media exposure would possess more knowledge about animal welfare laws.

In medium herd size category, social participation was found the most critical variable affecting the knowledge of farmers positively, as the direct effect of this variable was found the highest and exerting its influence indirectly through economic motivation, education and mass media exposure. It may be inferred that farmers who socially participated more are likely to acquire more knowledge about animal welfare laws. However, in large herd size category, family size was found the most potent variable affecting the knowledge of farmers positively, as the direct effect of this variable was highest. Indirectly its influence was through type of family, extension contact and education. This variable used eight variables in exercising their indirect influence indicating its significant role on the knowledge.

Mass media exposure, social participation and family size had maximum indirect influence on knowledge of dairy farmers in small, medium and large herd categories, respectively. Meena *et al.* (2009) also reported that mass media exposure, localite source of information, risk orientation, herd size, cosmopolite source of information and education to have indirect positive indirect influence on level of knowledge.

Hence, to enable the farmers in increasing their knowledge on animal welfare laws all the variables showing maximum direct effect should be considered. Also the variables through which maximum total indirect effect is exerted and substantial indirect influences are channelized should be focused on for increasing the knowledge of the farmers on animal welfare laws.

REFERENCES

Arora, A.S., Kumar, A., Bardhan, D. and Dabas, Y.P.S. (2006). Socio-economic and communication variables associated with level of knowledge and degree of adoption of improved dairy husbandry practices in U.S. Nagar district of Uttaranchal. *Indian J. Dairy Sci*. **59(5)**: 337-343.

Austin, E. J., Deary, I.J., Jones, G.E. and Dale, A. (2005). Attitudes to farm animal welfare factor structure and personality correlates in farmers and agriculture students. *J. Individ. Differ.* **26(3)**: 107-120.

Bock, B.B. and van Huik, M.M. (2007). Animal welfare: the attitudes and behaviour of European pig farmers. *British Food J.* **109(11)**: 931-944.

Bracke, M.B., Greef, M.K. and Hopster, H. (2005). Qualitative stakeholder analysis for the development of sustainable monitoring systems for farm animal welfare. *J. Agric. Environ. Ethics* **18**: 27-56.

Edwards, A.L. and Kilpatrick, F.P. (1948). A technique for the construction of attitude scales. *J. Appl. Psychol*. **32**: 374-384.

Fraser, D. (2001). Farm animal production: changing agriculture in a changing culture. *J. Appl. Anim. Welf. Sci*. **4**: 175-190.

Kauppinen, T., Vainio, A., Valros, A., Rita, H. and Vesala, K.M. (2010). Improving animal welfare: qualitative and quantitative methodology in the study of farmer's attitudes. *Anim. Welfare* **19(4)**: 523-536.

Lassen, J., Sandoe, P. and Forkman, B. (2006). Happy pigs are dirty! Conflicting perspectives on animal welfare. *Livestock Sci*. **103**: 221-230.

Levy, N. (2004). What Makes Us Moral? Crossing the Boundaries of Biology. One World. Oxford, UK.

Lund, V., Hemlin, S. and White, J. (2004). Natural behavior, animal rights, or making money-A study of Swedish organic farmers' view of animal issues. *J. Agri. Environ. Ethics* **17**: 157-179.

Meena, B.S., Singh, A.K., Chauhan, J. and Sankhala, G. (2009). Farmers knowledge on feeding practices of dairy animals in Jhansi district. *Indian Res. J. Ext. Edu*. **9(1)**: 28-31.

Meena, M.S., Singh, K.M., Malik, B.S., Meena, B.S. and Kanwat, M. (2012). Knowledge index for measuring knowledge and adopting scientific methods in treatment of reproductive problems of dairy animals. *J. Agric. Sci*. **4(10)**: 81-88.

Mejdell, C.M. (2006). The role of councils on animal ethics in assessing acceptable welfare standards in agriculture. *Livest. Sci*. **103**: 292-296.

Prevention of Cruelty to Animals Act (1960). The Prevention of Cruelty to Animals Act (59 of 1960). As amended by Central Act 26 of 1982. Available at: www.envfor.nic.in/legis/awbi/awbi01.html.

Raval, R.J. and Chandawat, M.S. (2011). Extent of knowledge of improved animal husbandry practices and socio-economical characteristics of dairy farmers of district Kheda, Gujarat. *International J. Farm Sci.* **1(2)**: 129-137.

Serpell, J. (1999). Sheep in Wolves' Clothing? Attitudes to Animals among Farmers and Scientists. In: Attitudes to Animals: Views in Animal Welfare. F.L. Dolins (edt.) Cambridge University Press, Cambridge, UK.

Sharma, K. and Singh, S.P. (2008). Dairy farmers knowledge about buffalo feeding practices. *Haryana Vet.* **47**: 68-71.

Sharma, K., Singh S.P. and Yadav, V.P.S. (2009). Knowledge of dairy farmers about improved buffalo husbandry management practices. *Indian Res. J. Ext. Edu.* **9(3)**: 51-53.

Velde, H.T., Aarts, N. and Van Woerkum, C. (2002). Dealing with ambivalence: Farmers and consumers perceptions of animal welfare in livestock breeding. *J. Agric. Environ. Ethics* **15**: 203-219.