

KNOWLEDGE, ATTITUDES AND PRACTICES OF DAIRY FARMERS OF PUNJAB, INDIA TOWARDS ANTIBIOTIC USAGE

PALLAVI MOUDGIL^{1*}, J.S. BEDI, R.S. AULAKH, J.P.S. GILL and PARMINDER SINGH²
Centre of One Health, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana-141004, India

¹Department of Veterinary Public Health and Epidemiology,

Lala Lajpat Rai University of Veterinary and Animal Sciences Hisar-125004, India

²Department of Veterinary and Animal Husbandry Extension Education,
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana-141004, India

Received: 05.08.2021; Accepted: 30.09.2021

ABSTRACT

Very scarce information is available about antibiotic usage patterns in dairy herds of many developing countries including India. A survey was conducted on antibiotic usage in 166 dairy herds located in nine districts of Punjab, India. The knowledge, attitudes and practices (KAP) of dairy farmers towards antibiotic usage were assessed using personal interview. The dairy farms were categorized into small (less than 10 animals), medium (10-30 animals) and large (more than 30 animals) farms. A total of 61 small, 55 medium and 50 large dairy farms were surveyed. The study revealed that the farmers of large dairy farms have more knowledge and follow good practices associated with antibiotic usage as compared to small and medium dairy farmers ($p < 0.05$). The results of this study are useful for understanding the patterns of antibiotic usage and associated managerial practices followed by farmers in small, medium and large dairy farms.

Keywords: Antibiotics, Attitudes, Dairy farms, Knowledge, Practices

How to cite: Moudgil, P., Bedi, J.S., Aulakh, R.S., Gill, J.P.S. and Singh, P. (2022). Knowledge, attitudes and practices of dairy farmers of Punjab, India towards antibiotic usage. *Haryana Vet.* 61(1): 95-98.

The intensification of livestock farming is coupled with augmented administration of antibiotics to control and treat infections. Antibiotics are largely used in dairy industry for prophylactic and therapeutic purpose but not for growth promotion. In a study by Van Boeckel *et al.* (2015), China (23%), United States (13%), Brazil (9%), India (3%) and Germany (3%) emerged as five top most countries in 2010 in terms of antimicrobial use in livestock production.

The antibiotics are used in dairy cattle particularly as intra-mammary infusions to control and treat udder infections and non-adherence to withdrawal periods results in occurrence of their residues in milk. Milk containing antibiotics in sub-lethal concentration when consumed for longer duration may substantiate potential health risks to consumers. One of the most important matter of concern is the emergence of antibiotic resistant bacteria in animals that can transmit to humans and animals, further resulting in infections with antibiotic resistant pathogens.

The sound knowledge towards judicious use of antibiotics in dairy animals is fundamental to prevent occurrence of residues in milk. So far, no studies have been attempted to assess knowledge, attitudes and practices of dairy farmers towards patterns of antibiotic use on dairy farms in Punjab, India. Thus, the present study was envisaged with an aim to interview the dairy farmers towards antibiotic usage in dairy herds using structured

questionnaire.

MATERIALS AND METHODS

Dairy farms: A cross-sectional study was conducted in 166 dairy farms located in 9 districts (Ludhiana, Sangrur, Barnala, Moga, Bhatinda, Gurdaspur, Ferozepur, Kapurthala and Amritsar) of Punjab. The dairy farms were categorized according to their herd size into small (SDF: 10 animals), medium (MDF: 10-30 animals) and large (LDF: more than 30 animals) dairy farms. The verbal consent was obtained from all the farmers who agreed to participate in the study. A total of 61 small, 55 medium and 50 large dairy farms were surveyed.

Personal interview: The set of questions (containing close end questions) to assess the knowledge, attitudes and practices of dairy farmers towards antibiotic usage were formulated following the questionnaires used by Redding *et al.* (2014) and Sawant *et al.* (2005). The questions were divided into three sections: (1) information related to dairyfarm (2) information regarding dairy animals (3) use of antibiotics in dairy animals which comprised questions based on knowledge, attitudes and practices. The personal interview was then conducted using set of questions with the farmer or owner of each dairy farm.

Statistical analysis: The data was analyzed statistically using Microsoft Excel spreadsheets. The answers to the questionnaires were transferred to the data sheet and grouped as per responses obtained ("1" for "yes" and "0" for "no"). The knowledge, attitudes and practices of dairy

*Corresponding author: pallavi.moudgil@luvas.edu.in

farmers of three different farm types towards antibiotic usage were compared using chi square test. A value of $p < 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

The three types of dairy farms were tested statistically for the appraisal of differences in the knowledge of farmers towards antibiotics usage. To the first question “Do you know what an antibiotic is?” there was no statistically significant difference in responses from the farmers of three dairy farm types. When asked to give names of antibiotics they know, most of farmers answered the trade names of the commonly used antibiotics such as enrocin, terramycin, betacef etc. Some of them were also able to answer the generic name of antibiotics as such; ampicillin and gentamicin. Some farmers also named non-steroidal anti-inflammatory drugs (NSAIDs) as antibiotics such as vetalgin/novalgin, nimovet etc. The results of the remaining knowledge-based questions revealed that farmers from large dairy farm answered more correct responses as compared to farmers from medium dairy farm and small dairy farm (Table 1). The farmers of three different dairy farm types exhibited no significant difference in their knowledge about basic information regarding antibiotics. The most commonly used antibiotic groups in dairy farms were fluoroquinolones, tetracyclines, penicillins, cephalosporins, aminoglycosides and sulphonamide-trimethoprim. The use of limited number of antibiotic groups in dairy cattle can contribute to the emergence of antibiotic resistant bacterial strains and can further lead to treatment failures (Redding *et al.*, 2014; Shitandi and Sternesjo, 2004). Various other studies carried out in the past also highlighted the use of limited number of antibiotic groups for the treatment of dairy cattle (Redding *et al.*, 2014; Serraino *et al.*, 2013) The limited resources such as economic constraints and availability of limited number of antibiotics in the local markets could be ascertained as possible reasons for the

use of limited antibiotic preparations to treat dairy cattle.

The significantly better knowledge of large dairy farmers towards health hazards associated with consumption of milk containing antibiotic residues as well as appearance of residues in milk of treated animals could be attributed to their active participation in training programs related to quality milk production and knowledge sharing with local veterinarians.

The knowledge of farmers about antibiotic withdrawal period differed significantly amongst three dairy farm types. Although most of the large dairy farmers possessed the knowledge about withdrawal period but many of them failed to answer the time period for which milk should not be offered for human consumption.

The results of attitude-based questions showed that LDF responded more correct answers as compared to MDF and SDF (Table 2). There was no statistical significant difference in the attitudes of the farmers of small, medium and large dairies in taking advice from veterinarians and all of them considered role of veterinarian extremely instrumental for administration of antibiotics in cattle. The responses to the questions were in corroboration with the observations of Jones *et al.* (2015), who assessed the factors affecting dairy farmer’s attitudes towards antimicrobial usage in cattle in England and Wales.

The three types of dairy farms were compared to assess antibiotic usage practices followed by different category of dairy farmers. To the question, “If antibiotics are not administered personally by veterinarian, then from whom you usually get advice?” Even 65.5%, 69% and 64% of SDF, MDF and LDF, respectively answered that they take advice (telephonically) from “veterinarian” while 24.5%, 9% and 6% of SDF, MDF and LDF, respectively answered “chemist/seller”. Ten percent of small, 22% of medium and 30% of LDF answered that “when they see symptoms or disease condition in cattle they do themselves”.

Table 1
Dairy farmer’s knowledge on antibiotic usage

Question (correct response)	Total % (n/N)	Whole % (n/166)			χ^2	p value
		Large dairy farm (n=50)	Medium dairy farm (n=55)	Small dairy farm (n=61)		
Do you know what an antibiotic is? (yes)	23.5 (39/166)	34 (17/50)	20 (11/55)	18 (11/61)	4.45	0.108
Do you know that antibiotics appear in the milk of treated animal? (yes)	60 (99/166)	74 (37/50)	60 (33/55)	47.5 (29/61)	8.0	0.018*
Do you know about health hazards associated with consumption of milk containing antibiotic residues? (yes)	53.6 (89/166)	76 (38/50)	45 (25/55)	43 (26/61)	14.5	0.001*
Do you know about withdrawal period of antibiotics? (yes)	35 (58/166)	50 (25/50)	29 (16/55)	28 (17/61)	7.15	0.028*

* $p < 0.05$

Table 2
Dairy farmer's attitudes on antibiotic usage

Question (correct response)	Total % (n/N)	Whole % (n/166)			χ^2	p value
		Large dairy farm	Medium dairy farm	Small dairy farm		
Do you think veterinarian should be consulted before administering antibiotics to animals? (yes)	20 (37/166)	28 (14/50)	22 (12/55)	18 (11/61)	1.58	0.452
Does the cost of antibiotic matter to you while purchasing? (no)	55.4 (92/166)	76 (38/50)	56.3 (31/55)	38 (23/61)	16.3	0.000*
Do you think maintenance of treatment records of animals is essential? (yes)	44.6 (74/166)	76 (38/50)	33 (18/55)	30 (18/61)	28.7	0.000*
Do you think milk from antibiotic treated cows should be mixed with milk of untreated ones? (no)	72 (120/166)	84 (42/50)	73 (40/55)	62.2 (38/61)	6.50	0.039*
Do you think antibiotic samples received from medical representatives should be used in cattle? (no)	15 (25/166)	1 (5/50)	16.3 (9/55)	18 (11/61)	1.49	0.473

*p<0.05

Table 3
Dairy farmer's practices towards antibiotic usage

Question (correct response)	Total % (n/N)	Whole % (n/166)			χ^2	p value
		Large dairy farm	Medium dairy farm	Small dairy farm		
Does the farm maintain written records for treating sick animals with antibiotics? (yes)	40.3 (67/166)	54 (27/50)	40 (22/55)	30 (18/61)	6.85	0.033*
Are treated cows marked as treated? (yes)	46.3 (77/166)	66 (33/50)	42 (23/55)	34.4 (21/61)	11.7	0.003*
Are treated cows physically separated from untreated one? (yes)	22 (36/166)	22 (11/50)	22 (12/55)	21.3 (13/61)	0.76	0.684
Are treated cows milked separately from untreated ones? (yes)	60 (99/166)	78 (39/50)	53 (29/55)	51 (31/61)	10.0	0.007*
Are treated cows milked with a separate milking unit? (yes)	23.4 (39/166)	30 (15/50)	24 (13/55)	18 (11/61)	2.19	0.334
Is practice of extra label use of antibiotics followed? (no)	23 (38/166)	26 (13/50)	18.1 (10/55)	24.5 (15/61)	1.06	0.587
Do you follow withdrawal period for antibiotics? (yes)	42.1 (70/166)	58 (29/50)	38.1 (21/55)	33 (20/61)	7.69	0.021*
Do you receive antibiotic samples from medical representative for using in animals? (no)	18 (31/166)	16 (08/50)	14.5 (08/55)	24.5 (15/61)	2.25	0.323

*p<0.05

When asked, “What do you do with the milk of antibiotic treated animal?” 52%, 65% and 38% of SDF, MDF and LDF, respectively answered that they “continue selling the milk”. The remaining farmers answered that milk is “consumed by family” (SDF 11.4%; MDF 7.3%; LDF 4%), “throw it away” (SDF 7%; MDF 5%; LDF 10%), “feed to calves” (SDF 18%; MDF 16.4%; LDF 42%) and “feed to guard dogs” (SDF 17.8%; MDF 5.5%; LDF 6%). To the question, “Following the administration of an antibiotic, does the course of treatment completed?” 54%, 56.3%, 64% of SDF, MDF and LDF, respectively answered “always”; 41%, 32.7%, 24% of SDF, MDF and LDF, respectively answered “sometimes” and 5%, 11%, 12% of SDF, MDF and LDF, respectively answered “never”. To the question, “Do you give medicated feed to

your animal?” farmers from all the three dairy farm types answered “no”.

The remaining practices based questions with “yes” or “no” responses are presented in Table 3. The results revealed that LDF answered more correct responses as compared to MDF and SDF. Regarding the practices adopted in dairy farms, most of the farmers of three farm types were of the opinion that only veterinarian should administer antibiotics to their cattle or should take advice from a veterinarian before administration. Various previous studies had also highlighted the role of veterinarian to be instrumental for administration or on taking advice before administration of antibiotics to cattle (Jones *et al.*, 2015; Sawant *et al.*, 2005).

The farmers from all three dairy farm types were not

completely aware of antibiotic withdrawal period and kept on selling the milk of treated cattle. The earlier studies/surveys carried out for assessing the knowledge of dairy farmers pertaining to antibiotic withdrawal period exhibited that dairy farmers of low or middle income nations possess limited knowledge regarding antibiotic withdrawal periods in treated animals. Only 33% of the dairy farmers responded positively for the questions related to drug withdrawal periods in the surveys carried out by Redding *et al.* (2014) in rural Peru. Whereas, Beyene *et al.* (2015) highlighted through surveys that 70% of the dairy farms of Central Ethiopia did not follow antibiotic withdrawal periods. Abebew *et al.* (2014), while surveying the dairy producers in Ethiopia highlighted the fact that poor knowledge of drug withdrawal period and insufficient record keeping were the precipitating factors for occurrence of residues in milk.

Approximately 50% of the respondents of all the dairy farm types 'always' practiced complete antibiotic treatment protocol. However, the remaining respondents either 'sometimes' or 'never' complete the protocol, which could either be due to economic constraints; difficulty in antibiotic administration or considering the animals cured after few antibiotic dosages. The practice of maintaining incomplete antibiotic treatment protocols act as major driver for emergence of antibiotic resistant bacteria (Jones *et al.*, 2015).

The large dairy farmers followed better managerial practices related to antibiotic usage such as maintenance of records of treated cattle, marking of treated animals, milking of treated cows separately and following of antibiotic withdrawal period etc. as compared to small or medium dairy farmers. Such practices prevent occurrence of antibiotic residues in milk intended for human consumption (Sawant *et al.*, 2005).

The practice of use of antibiotics in animals received from medical representatives and extra label use of antibiotics was not followed by most of the farmers at all three dairy farm types. The survey also revealed that the practices like separation of treated animals from untreated ones and milking of treated cows with separate milking unit were not performed. The large dairy farmers claimed that they had all their animals tagged and possessed complete treatment records. Whereas, medium and small dairy farmers raised a point that they possess less number of animals and could easily identify the diseased and treated animals. Thus, all the dairy types did not opt for separation of treated animals.

CONCLUSIONS

The present study revealed considerable variation in knowledge, attitudes and practices adopted by small, medium and large dairy farms in the study area. Large dairy farmers had better knowledge towards judicious use of antibiotics and followed good practices as compared to small and medium dairy farmers. The study highlighted a need to generate awareness among dairy farmers (especially of small and medium dairy farms) about judicious antibiotic usage to prevent occurrence of their residues in milk and thus preventing the development of antibiotic resistant strains and unacceptable health risks to consumers.

ACKNOWLEDGEMENTS

Authors are thankful to "Rashtriya Krishi Vikas Yojana" (RKVY), Government of India, for providing funds for undertaking the study through research project entitled "Studies on current scenario of antibiotic residues in foods of animal origin in Punjab and prevention of antibiotic risks."

REFERENCES

- Abebew, D., Belihu, K. and Zewde, G. (2014). Detection and determination of oxytetracycline and penicillin G antibiotic residue levels in bovine bulk milk from Nazareth dairy farms. *Ethiop. Vet. J.* **18**: 1-15.
- Beyene, T., Kemal, A., Jibat, T., Tadese, F., Ayana, D. and Feyisa, A. (2015). Assessment of chemicals and drugs residue in dairy and poultry products in Bishoftu and Modjo, Central Ethiopia. *J. Nutr. Food Sci.* **S13**: S13002doi: 10.4172/2155-9600.1000S13-002.
- Jones, P.J., Marier, E.A., Tranter, R.B., Wu, G., Watson, E. and Teale, C.J. (2015). Factors affecting dairy farmers' attitudes towards antimicrobial medicine usage in cattle in England and Wales. *Prev. Vet. Med.* **121**: 30-40.
- Redding, L.E., Cubas-Delgado, F., Sammel, M.D., Smith, G., Galligan, D.T., Levy, M.Z. and Hennessy, S. (2014). The use of antibiotics on small dairy farms in rural Peru. *Prev. Vet. Med.* **113**: 88-95.
- Sawant, A.A., Sordillo, L.M. and Jayarao, B.M. (2005). A survey on antibiotic usage in dairy herds in Pennsylvania. *J. Dairy Sci.* **88**: 2991-2999.
- Serraino, A., Giacometti, F., Marchetti, G., Zambrini, A.V., Zanirato, G., Fustini, M., and Rosmini, R. (2013). Survey on antimicrobial residues in raw milk and antimicrobial use in dairy farms in the Emilia-Romagna Region, Italy. *Ital J. Anim. Sci.* **12**: 422-425.
- Shitandi, A. and Sternesjo, A. (2004). Prevalence of multidrug resistant *Staphylococcus aureus* in milk from large and small scale producers in Kenya. *J. Dairy Sci.* **87**: 4145-4149.
- Van Boeckel, T.P., Brower, C., Gilbert, M., Grenfell, B.T., Levin, S.A., Robinson, T.P., Teillant, A. and Laxminarayan, R. (2015). Global trends in antimicrobial use in food animals. *Proc. Natl. Acad. Sci. USA.* **112**: 5649-5654.