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The Effect of Dairy Farmers' Technical Knowledge on Milk Bacterial Count

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Abstract: Given the available reports compiled by different Iranian researchers, the raw milk bacterial count absolutely poses a poor quality in Iran. Concering the current status and its hazards, this study addresses the useful guidelines towards improved and sanitary milk production by dairy farmers. The statistical population comprises of all industrial dairy farmers in Shiraz and Marvdasht districts who were delivering their milk to Fars Pegah Dairy Factory. The sample size was computed by Mourgan Table composed of 175 subjects (n=175). This study used a questionnaire for gathering the required information. Also, Fars Pegah Dairy processing factory experimental data were analyzed to detect statistical Total Bacterial Count (TBC) of every dairy farmers. The results of the study showed that the total bacterial counts of the samples do not reflect a desired limit, and instead, those dairy farmers participated educational programs could widely control total bacterial count of the milk even down to less than 25,000 CFU/ml. This depicts that there was negative and significant relationship between participating in educational programs and technical knowledge with total bacterial count of the milk. Also, dairy farmers who participated in educational programs could improved their technical knowledge. Finaly Based on the findings of this study, some suggestions are presented for reducing total milk bacterial count at dairy farms.

Keywords: Total bacterial count (TBC), Technical Knowledge, Industrial dairy farmers

Introduction

Milk, remarks a complete and nutritious food which supplies protein, lipids, carbohydrates, vitamins and mineral substances needed for human growth. Milk nutrition value deserves a significant and undeniable position in our feeding programme and therefore, is highly consumed in different food courses (Early, 2010). Meanwhile, many vitamins in milk act as antioxidant (Mirshahi, 2002). As a whole, the consumption of milk and milk products is often in respect to possible health issues (Beever, 2006). Milk with rich ingradients, is sensitive to microbial contamination under improper conditions (Salari et al., 2009). It could be contaminated in process of production, collection, storing and transporting (Harding, 2007). Although, pasteurization has substantially reduced contamination and supplies healthier and safer dairy products, but yet there is resistive microbes against temperatures whose enzymes and poisons still remain and not neutralized during the process. (Khosravi and Ghaznavi, 2008). High bacterial counts of milk has seriously endangered society health. Also, Low quality of the local milk production in dairy farms (for high bacterial count) has seriously endangered even the related economic sectors (Bakhshi. Jahromi, 2004) and also have a negative effect on the processability of dairy products.

Total bacterial count (TBC) is the first and most important methodology that is widely used by technicians and dairy farmers in measuring production quality, cleanliness, sanitation and shelf life of milk and related dairy products. Therefore, TBC is assumed as a useful variable for quality promotion and observation of the milk. In fact, TBC is governed by many variables which need to be detected precisely. Also, this is regarded as major factor in determining and settling the milk price to producers (Gonzalo et al, 2006). The TBC of the milk is meant as the total number of living bacteria per milliliter of its volume. Total Bacterial Count of the milk is measured and expressed in CFU/ml. table 1 shows the Iranian national standard for raw milk grading based on TBC evaluation (Mohebbi, 2011). Given the available reports compiled by different Iranian researchers, the raw milk bacterial count absolutely poses a poor quality in Iran. (Khamiri and Ghasemian

Fard, 2006) and it is a long way for Iranian dairy farmers to reach an acceptable and standard milk production (Farbudi and Mortezavi, 2008). It is clear that TBC can be improved via abiding with hygienic principles and enhancing management practices (Obrien et al, 2009). So, reduction of total bacterial count of milk have need to regard of some principles that dairy farmers have to do. Production of low bacterial count milk starts in the dairy farms and depends on management practices applied by dairy farmers. So, this study addresses the useful guidelines towards improved dairy farmers' ability. So, the related research has been given:

Haji Mir Rahimi (2003). performed a study to analyze the impacts of informal trainings on economic rural development and came to the conclusion that such trainings are very effective in rising animal yields. Moreover, training the dairy farmers shall increase their income, performance and productivity. The next research adopted by Jannat et al. (2008) who mainly investigated Golpaigan dairy farmers attitude on training impacts in milk quality improvement. They concluded that there is a positive and significant relationship between educational level and dairy farming experience with technical knowledge. Also, there is a positive and significant relationship between participating in educational programs and use of extension publications with technical knowledge about quality of milk. Another investigation ran by Yarahmadi et al. (2006) shows a survey on statistical variances of raw milk quality collected via different methods in Lorestan province. They noted a significant reduction in TBC of those dairy farmers participating in educational programs. Also Rahmani (2005) in his analysis on economic productivity and effective factors contributing to milk production in Fars province came up to a significant difference in the mean productivity indexes of those took part and not in training campaigns. He stressed on a positive impact generated by dairy farmers participation in extension-training campaigns followed by recommending integrated plans for proper implementation of such courses benefiting community awareness.

So, The main purpose of this paper is to study dairy farmers' technical knowledge impact on the total milk bacterial count. Subsidiary purposes as outlined below:

1. Identification of general aspects of dairy farmers,
2. Evaluation of the technical knowledge of dairy farmers,
3. Determination the role of technical knowledge of dairy farmers on total milk bacterial count(TBC)
4. Determination the role of general aspects of dairy farmers on total milk bacterial count
5. Addressing the role of education on technical knowledge of dairy farmers

Materials and Methods

A survey method was used in this study. The statistical population comprises of all industrial dairy farmers in Shiraz and Marvdasht districts who were delivering their milk to Fars Pegah dairy processing factory during 2011 (N=320). The sample size was computed by Mourgan Table composed of 175 subjects (n=175). This study used a questionnaire for gathering the required information. Also, Fars Pegah dairy processing factory experimental data were analyzed to detect statistical TBC of every dairy farm. Shiraz university instructors and p.hd. students of Extension-Education faculty shared their visions in validity of the questionnaire. For verification of the analysis, 30 questionnaires were also completed by other industrial dairy farmers of Sepidan and Arsanjan districts who used to submit their milk to Fars Pegah Milk factory. Then, entering the data and running spss software (version 18) led to determination of Coronbach Alfa Coefficient at reasonable reliability index.

Results and Discussion

1- general aspects of dairy farmers

Results derived from respondents age displayed that their mean age is 44.5 years (standard deviation =11.54). Pursuant to the above mean age, majority of sample group compose of middle-age and concerning the results of literacy frequency distribution, mean years of studying equals to 7.4 and more than half of the respondents have 6-10 years literacy profile. Mean dairy farmers experience shows 22.3 years among them. Highest frequency belongs to dairy farmers with 10 years farming experience. They represent max. 60 years and min. 1 year dairy farming experience. Mean T.V. watching remarks 2.75 hours per day with 0 to 6 hrs. as min. and max. respectively. Also, majority of them (84%) are members of dairy farmers coopratives. Mean number of participations in educational programs is 4 times per year by dairy farmers. As seen in Table 2, most respondents(60.1%) have participated in educational programs 4 or less than 4 times per year. Also as figured out in Table 2, dairy farmers are classified into 4 groups based on number. of their visits to advanced dairy farms whose frequencies are seen in that Table. Most frequency belongs to respondents with 5 times visits of the advanced dairy farms.

2- Status of dairy farms

According to the result of this study mean number of cattle (cow, beef and non-dairy cow) in target farms shows 123 heads with 15 and 400 as the min. and max. In addition, mean no. of dairy cattle amounts up to 88 heads plus 8 and 350 heads as min. and max. The highest rate of milk production recorded as 9000 kg. per day against the lowest rate equal to 160 kg. per day. The mean price of selling milk to Fars Pegah milk factory marked 4060 Rls./kg. in the month of July 2011 whereas, its min. and max. prices ranged between 3600-4500 Rls./kg. (quality stands as effective factor in determination of milk price by Fars Pegah milk factory i.e. the greater content of lipid and dissolved substances with lower TBC and somatic cells, the higher the price of cattle milk).

3- Experimental results of Total Bacterial Count (TBC)

Experimental results of TBC found by Fars Pegah dairy processing factory were used for detection of TBCs in July 2011 and came up with means for every dairy farmers in that period. Consequently, the research project could eventually figure out the mean for the sample milk equal to 3,917,857 CFU/ml

Besides, the sample showed its min. and max. TBC as 25,000 CFU/ml and 21,000,000 CFU/ml respectively (Table 3). This means a critical status in the quality of the raw milk delivered to the factory, however, upon the national standard, the milk can hardly secure the grade 3. Therefore, serious care should absolutely be taken in reducing the TBC in favor of quality promotion of milk and its by-products.

4- Evaluation of dairy farmers' technical knowledge

For evaluating technical knowledge of the dairy farmers, they were should respond on 3 measures in each of before, during and post milking stages (totally 9 items). Further, responses were coded and evaluated. Dairy farmers who had the best score, gave 9 and who had no response was gaven a score of zero. The mean of technical knowledge was 6.6 (the mean range was between 0- 9) and standard deviation was 1.6. The mean of technical knowledge in each of before, during and after milking was 2.43, 2.34 and 1.83 (the mean range was between 0- 3). This result indicated that the technical knowledge of dairy farmers at after-milking stage was poor.

5- Impact of personal aspects on the Milk Total Count

Results generated from Pearson Correlation Coefficient display that there was a negative and significan relationship between education level, dairy farming experience, annual book reading, Participants in educational program, meeting the experts in animal science, visiting advanced dairy farms, and technical

knowledge with total bacterial count (Table 4). This means that enhancing every aspect on the parts of dairy farmers' knowledge and culture, shall give rise to TBC reduction of dairy farmers milk and promotion of society heath.

6- Comparison of TBCs and dairy farmers' technical knowledge between dairy farmers did and did not participate in training programs for milk improvement

Results of t- test depicts that mean TBCs of the two foregoing groups deserve a significant difference (0.000), so that the mean of those participated in training sessions comparatively marked lower quantity. Upon the t- test, there identified a significant difference (≤0.001) between means of technical knowledge of those who did and did not participate in milk qualification campaigns. This remarks for impressive impact of training sessions on breeders technical know-how (Table 5) .

This research project essentially focused on examining the impact of dairy farmers' technical knowledge on TBC reduction and wrapped up with certain operational scopes and recommendations as articulated below:

1) Given the lower know-how traced among dairy farmers particularly on arrangements at post milking stage compared to before and during milking stages, it is recommended to hold continuous educational programs for post-milking stage, plus encouraging the dairy farmers to seriously participate in such educational programs.

2) Since meeting with Subject Matter Specialists had negative and significant relation with total milk bacterial count, hence SMEs are requested to progress their linkage with dairy farmers favoring improved performance and yield.

3) According to the negative and significant relationship between dairy farmers' participation in educational programs and their milk TBC, they ought to be motivated for participating in such programs in order to reduce total bacterial count of dairy farmers.

4) Relevant to negative and significant correlation exists between dairy farmer' visit to advanced farms and their milk TBC, it is highly emphasized to plan useful visits to leading dairy farms via experts. Such opportunities shall effectively inspire updated methods to local breeders for reduction of milk TBC.

5) Reading technical books (literatures, journals, reports, etc.) generates a positive and significant relation with milk TBC. Therefore, it seems crucial if dairy farmers could be progressed to read more technical extension-training matters. Finally, owing to impressive impact of personal knowledge and culture on improved milk and subsidiaries quality, it is suggested to employ various elements including constructive T.V. programs in this concern.

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Table 1. Raw milk grading based on Iranian national standard CFU/ml.

Grade	CFU/ml
Premium	*< 30,000*
Grade 1	*30,000-100,000*
Grade 2	100,000-500,000
Grade 3	500,000-1000,000

Table 2. Frequency distribution of dairy farmers participation in educational programs and visiting advanced dairy farms (per year)

Variables	**Groups**	**Frequency**	**%**
No. of participation	4≥	104	60.1

	5-8	51	29.5
	≥9	18	10.4
	Total	173	100
No. of visits by each group	0	33	19.5
	1-5	83	49.1
	6-19	34	20.2
	≥11	19	11.2
	Total	169	100

Table 3. TBC status of the dairy farms milk

Grade	CFU/ml	Frequency	percent	Cumulative percent
Premium	*<30,000*	1	0.6	0.6
Grade 1	*30,000-100,000*	4	2.4	2.9
Grade 2	100,000-500,000	26	15.2	17.7
Grade 3	500,000-1000,000	23	13.2	30.9
Other Grades	1,000,000- 3,000,000	40	22.9	53.7
	3,000,000- 5,000,000	40	22.9	76.6
	5,000,000- 7,000,000	13	7.4	84.0
	7,000,000- 9,000,000	5	2.8	16.0
	≥ 9000000	23	13.1	100.0
Mean= 3,917,857 CFU/ml		Standard deviation=4,665,773		
Min= 25,000 CFU/ml		Max= 21,000,000 CFU/ml		

Table 4. Relationship between some variables with TBC

Variables	r	p
Age	-0.015	0.846
Education level	-0. 108	0.16
Dairy farming experience	-0.152	0.049
Annual book reading	-0.208	0.006
Participants in educational programs	-0.439	0.000
Meeting the experts	-0.248	0.001
Visiting advanced dairy farms	-0.353	0.000
Technical knowledge	-0.635	0.000

Table 5. Comparison of the means of TBC and dairy farmers' technical knowledge between dairy farmers did and did not participate in Technical training program

Variables	Participants in educational program	Mean	T Test	p
TBC	Did	2734465	-5.616	0.000
	Did not	9913862		
Technical knowledge	Did	6.94	6.57	0.000
	Did not	4.93		