

Competencies in Dairy Production Needed by Dairy Farmers of Kuku Cooperative Dairy Society in Khartoum State, Sudan

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Abstract

The dairy farmers of Sudan are facing the lack of some competencies needed for improving the dairy productivity of their cattle. Therefore it is very important to study the farmers competencies in order to put plans for improving the farmers conditions and go for better productivity. The main objective of this study was to identify the competencies in dairy production of Kuku Cooperative Dairy Society (KCDS) in Khartoum State. A random sample of 81 dairy farmers was drawn from the total 162 members of KCDS. A questionnaire was carefully prepared that included a list of 8 understandings and 27 important abilities in the field of dairy production. A rating scale was provided with a 0 to 4 range of the abilities and understandings. The personal interviews with the farmers in the sample were conducted during January, 2013. The data was analyzed using the Statistical Package for Social Science (SPSS). It was concluded that the dairy farmers need more competencies in dairy production. Some competencies need more emphasis than others. The dairy farmers felt that they possessed fewer competencies in dairy production than their actual need. Farmers indicated that they need more competence in areas related to calculating net farm income, selecting sires with high proofs and high repeatability, identifying mastitis problems and treating mastitic cows, recognizing symptoms of sick animals, following the vaccination program, the proper management and the adequacy of feeding calves and herd replacements, and the identification of common parasites.

Keywords: competencies, dairy production, dairy farmers, extension education, competencies needed, competencies possessed

1. Introduction

The emphasis placed on competency-based education in all areas of education has received much recognition and support from all educational programs. Agricultural and extension educators first initiated research in competency-based approaches in areas such as agriculture, animal production, and adult education and subsequently in extension education (Oladele et al., 2011; Demenongu et al., 2015; Adisa, 2015). The effectiveness of the educational programs of extension depends on the competence of its staff (Ibrahim, 2011). With rapid economical, ecological and technological changes occurring, educational programs in extension must make adjustments in order to stay abreast of the new developments. These programs adjustments cannot take place, however, without competent, well-qualified personnel available to conduct those educational programs (Harris, 1995; Adhikary, 2006; Bowden, 2008) on the other hand, certain basic competencies are required for success in farming. The most important competencies needed by farmers can be determined. These competencies have implications for the educational programs for the present and the prospective farmers (Delauwere et al., 2015).

The dairy farmers of the developed countries have achieved a high degree of competency in both physical and mental abilities in the science of dairying. Such achievement did not occur as a result of a magic phenomenon or by chance, but from the combined efforts of the agricultural and extension educators, the researchers and the farmer themselves. Unfortunately, the just described situation is not the case in the KCDS. Why is the situation so different? What have the extension workers done to help? What does a dairy farmer need to know and what skills must he have to compete successfully in the dairy business? Which of these skills are the most important and which are the least important?

Meanwhile there is a general recognition for the need to help young and adult farmers (Boyle, 1981; Devendra, 2007; Omer, 2007; Abdel Rahim et al., 2010), the authors did not find other studies focusing on the competencies in various phases of livestock production in Sudan. The implications in all the competency studies, that the authors has reviewed, indicated that there are basic understandings and abilities that need to be possessed by those seeking a degree of success in farming and extension work (Shibah, 1983; Karbasioun, 2007; Ibrahim, 2011).

The main objective of this study is to investigate the status of dairy production competencies among KCDS in the Khartoum State. The specific objectives of the study are: (1) the identification of the degree by which dairy production competencies are needed and possessed by the dairy farmers, (2) the comparison between the degree of competence needed and the degree of competence possessed by the dairy farmers and (3) the comparison between the degree of competence needed and the degree of competence possessed when farmers are grouped by selected demographic factors.

2. Materials and Methods

2.1 Population and Sample

The population of the study was the dairy farmers of KCDS in the Khartoum State area. A listing of all farmers in the population was obtained from the Administration of the Dairy Society in Kuku area. One hundred and sixty two dairy farmers are the members of KCDS. A random sample of 81 dairy farmers was drawn from the population.

2.2 Selection of Competencies

A list of competencies was developed using the experiences of the researchers, dairy extension workers, the literature, and suggestions from the dairy specialists of the Federal Ministry of Animal Resources and Fisheries (FMARF). The questionnaire covered information related to the age, the educational level, the years of experience and the size of the herd, as well as a list of 8 understandings and 27 abilities related to the field of dairy science.

A rating scale was provided with a 0 to 4 range for abilities and understandings. The degree of competence was to be indicated with 0 indicating no degree needed (or possessed), 1 indicating little needed (or possessed), 2 indicating some degree needed (or possessed), 3 indicating much needed (or possessed) and 4 indicating very much needed (or possessed). This procedure will yield the perception of the dairy farmers as to the degree to which each understanding and ability is important to them, and the degree to which the farmers possessed each understanding or ability.

2.3 Data collection and Analysis

Personal interviews with the farmers in the sample were conducted by the team of the General Administration of Extension and Technology Transfer and the Federal Ministry of Animal Resources and Fisheries, during January, 2013. The collected information from the questionnaire was analyzed using the Statistical Package for Social Science (SPSS). This procedure resulted in a group of percentages, means and standard deviations that presented in the various tables of this study.

3. Results

3.1 Analysis of Dairy Production Competencies Needed and Possessed

Competencies in dairy production needed and possessed by dairy farmers were investigated in this section. Eight understanding and 27 abilities were studied. Tables 1 and 2 provide a summary of the degree to which each competency was needed and possessed by the dairy farmers. The overall mean scores for the 8 understandings was 2.3 and 2.7 for the 27 abilities, indicating that the dairy farmers needed some competency in most of the 35 understandings and abilities. The dairy farmers had higher overall competence needed mean scores than competence possessed mean scores for both understandings and abilities, indicating that farmers possessed none or little competency in the areas studies. The highest score (3.5) for degree of competence needed by the dairy farmers was for two abilities. These were: 1) the determination of net farm income and 2) the selection of sires with high proof and high repeatability.

Eleven more of the highest competence needed mean scores were rated 3.0 or above and all were abilities. These were: 1) the identification of mastitis problems and the treatment of mastitic cows (3.3); 2) the recognition of the symptoms of sick animals (3.3); 3) the following of the vaccination program (3.3); 4) the proper management and adequacy of calf feed and the herd replacements (3.1); 5) the selection of the desirable production and breeding stock (3.1); 6) the identification of the common parasites (3.1); 7) providing of assistant in the delivery

of calves (3.0); 8) the recognition of the possible calves disorders (3.0); 9) giving the optimum feed and care for the cows and calves at calving (3.0); 10) the correct stimulation of cows for proper milk letdown (3.0); and 11) the efficient use of high quality roughage (3.0).

The three highest degree needed mean scores for understandings were for: 1) the causes of infertility in dairy cattle (2.8); 2) the physical appearance of the profitable dairy animals (2.8); and 3) the importance of fresh water and minerals (2.7). The range in mean scores for the degree that understandings were possessed was (0.3) to (1.6). Four understanding received a rating of (1.0) (little competence possessed) or above. These were understandings of: 1) the importance of fresh water and minerals (1.6); 2) the physical appearance of the profitable dairy animals (1.6); 3) the dairy products standards and regulations set by Kuku Cooperative Dairy Society (1.4) and 4) the advantages and disadvantages of artificial insemination (AI) (1.1).

Table 1. Mean scores, standard deviations, and ranks for degree of competence needed and possessed by dairy farmers pertaining to understandings

Competency	Competencies needed		Competencies possessed	
	<u>Mean</u> S.D.	Rank	<u>Mean</u> S.D.	Rank
Understanding of:				
1. The dairy products standards and regulations set by Kuku Cooperative Dairy Society.	<u>2.5</u> 0.8	4	<u>1.4</u> 0.5	2
2. The physical appearance of profitable dairy animals.	<u>2.8</u> 1.1	1	<u>1.6</u> 0.7	1
3. The internal organs and their functions in dairy cattle.	<u>1.7</u> 1.7	5	<u>0.9</u> 0.9	4
4. The anatomy of the female reproductive tract and the known function of the tract.	<u>1.7</u> 1.4	5	<u>0.8</u> 0.7	5
5. The physiological process of the milk let down.	<u>1.3</u> 1.6	6	<u>0.3</u> 0.6	7
6. The causes of infertility in dairy cattle.	<u>2.8</u> 1.1	1	<u>0.5</u> 0.6	6
7. The importance of fresh water and minerals.	<u>2.7</u> 0.7	2	<u>1.6</u> 0.6	1
8. The advantages and disadvantages of the artificial insemination A.I.	<u>2.6</u> 1.7	3	<u>1.1</u> 0.9	3
Overall mean score for understandings	2.3		1.0	

Table 2. Mean scores, standard deviations, and ranks for the degree of competence needed and possessed by dairy farmers pertaining to abilities

Competency	Competencies needed		Competencies possessed	
	<u>Mean</u> S.D.	Rank	<u>Mean</u> S.D.	Rank
Abilities:				
1. The determination of age and/or weight at which the artificial insemination can be done.	<u>2.4</u> 1.8	8	<u>0.9</u> 0.7	10
2. Detecting the cows in heat and determining the best time for breeding.	<u>2.4</u> 1.7	8	<u>0.9</u> 0.7	10
3. Keeping the records of breeding, reproduction and production.	<u>2.4</u> 1.7	8	<u>0.6</u> 0.6	13
4. Using of the strip cup to detect milk abnormalities.	<u>2.9</u> 1.4	5	<u>0.2</u> 0.4	15

5. Following an efficient hand milking and regular milking routine.	<u>2.9</u> 0.7	5	<u>1.6</u> 0.5	3
6. Identifying mastitis problems and treating mastitic cows.	<u>3.3</u> 0.9	2	<u>1.2</u> 0.4	7
7. Assisting in the delivery of a calves.	<u>3.0</u> 0.8	4	<u>1.5</u> 0.6	4
8. Recognizing the possible calving disorders.	<u>3.0</u> 0.9	4	<u>1.4</u> 0.6	5
9. The use of antibiotics and medications correctly in treating minor health problems.	<u>2.0</u> 1.9	11	<u>0.6</u> 0.8	13
10. Recognizing the symptoms of sick animals.	<u>3.3</u> 0.7	2	<u>1.6</u> 0.6	3
11. Measuring the animal's temperature if illness is suspected.	<u>2.1</u> 2.0	10	<u>0.8</u> 0.4	11
12. Keeping health record of animals.	<u>2.0</u> 1.7	11	<u>0.3</u> 0.5	14
13. Identifying the common parasites (external).	<u>3.1</u> 0.8	3	<u>1.3</u> 0.4	6
14. The use of the proper parasite control methods.	<u>2.9</u> 0.9	5	<u>1.3</u> 0.4	6
15. Following the vaccination programs (health care).	<u>3.3</u> 0.6	2	<u>1.6</u> 0.7	3
16. Calculating the net farm income.	<u>3.5</u> 0.8	1	<u>1.8</u> 0.7	1
17. Keeping income and expense records.	<u>2.7</u> 1.4	6	<u>1.3</u> 0.9	6
18. Maintaining an adequate identification system of ear tagging, tattooing, etc.	<u>2.4</u> 1.6	8	<u>0.9</u> 0.7	10
19. Dehorning of the calves and the removal of extra teats from dairy heifers.	<u>0.5</u> 1.2	12	<u>0.0</u> 0.0	16
20. Group cooperation to promote dairy products.	<u>2.6</u> 0.6	7	<u>1.7</u> 0.7	2
21. Feeding the cows a balanced ration based on maintenance and production needs.	<u>2.2</u> 1.7	9	<u>1.0</u> 0.5	9
22. Making efficient use of high quality roughage.	<u>3.0</u> 0.9	4	<u>1.0</u> 0.5	9
23. Determining the amount and kind of concentrate to feed, considering dairy product prices and input (feed, labor, etc.) costs.	<u>2.1</u> 1.7	10	<u>0.7</u> 0.2	12
24. Giving feed and taking care of the cow and calf at calving.	<u>3.0</u> 1.1	4	<u>1.0</u> 0.4	9
25. Proper management of feed and its adequacy to calves and herd replacements.	<u>3.1</u> 1.0	3	<u>1.0</u> 0.3	9
26. Selecting sires with high proofs and high repeatability.	<u>3.5</u> 0.8	1	<u>1.4</u> 0.5	5
27. Selecting the desirable production and breeding stock.	<u>3.1</u> 1.0	3	<u>1.1</u> 0.4	8
Overall mean score for abilities	2.7		1.1	

3.2 Analysis of Mean Difference for Dairy Production Competencies

The dairy production competencies with the greatest mean score differences between the degree needed and the degree possessed by the dairy farmers are presented in Table 3. The differences for the 35 pairs of mean scores ranged between 0.5-2.7. The first five with largest differences between the degree needed and the degree possessed mean scores were: 1) the ability to use a strip cup to detect milk abnormalities (2.7); 2) understanding the cases of infertility in dairy cattle (2.3); 3) the ability to identify mastitis problems and treating the mastitic cows (2.1); 4) the proper management feed and its adequacy to calves and herd replacements (2.1) and 5) selecting sires with high proofs and high repeatability (2.1). According to the five-point scale used in this study, 31 of the 35 competencies were confirmed by the dairy farmers to be important. As a group, they rated these competencies 2.0 or more, a rating of “some” or above in importance. Out of the four remaining competencies, three were rated between 1.3 and 1.7. Only one was rated below 1.0 in terms of the degree of competence needed.

Table 3. Mean scores, standard deviations, and ranks for dairy production competencies with the greatest mean score difference between the degrees needed and the degree possessed by dairy farmers

Competency	Competencies needed	Competencies possessed	Mean difference
	<u>Mean</u> S.D.	<u>Mean</u> S.D.	
(U = understanding ; A = ability):			
A. Using a strip cup to detect milk abnormalities.	<u>2.9</u> 1.4	<u>0.2</u> 0.4	2.7
U. The causes of infertility in dairy cattle.	<u>2.8</u> 1.1	<u>0.5</u> 0.6	2.3
A. Identifying mastitis problems and treating the mastitic cows.	<u>3.3</u> 0.9	<u>1.2</u> 0.4	2.1
A. The proper management of feed and adequacy the calves and herd replacements.	<u>3.1</u> 1.0	<u>1.0</u> 0.3	2.1
A. Selecting sires with high proofs and high repeatability	<u>3.5</u> 0.8	<u>1.4</u> 0.5	2.1
A. Making efficient use of high quality roughage	<u>3.0</u> 0.9	<u>1.0</u> 0.5	2.0
A. Selecting the desirable production and breeding stock	<u>3.1</u> 1.0	<u>1.1</u> 0.4	2.0
A. Identifying the common parasites (external)	<u>3.1</u> 0.8	<u>1.3</u> 0.4	1.8
A. Keeping records of breeding, reproduction and production.	<u>2.4</u> 1.7	<u>0.6</u> 0.6	1.8
A. Following the vaccination programs (health care)	<u>3.3</u> 0.6	<u>1.6</u> 0.7	1.7
A. Calculating the net farm income	<u>3.5</u> 0.8	<u>1.8</u> 0.7	1.7
A. Keeping the health record of the animals.	<u>2.0</u> 1.7	<u>0.3</u> 0.5	1.7
A. Recognizing the symptoms of sick animals.	<u>3.3</u> 0.7	<u>1.6</u> 0.6	1.7
A. The proper use of the parasite control methods.	<u>2.9</u> 0.9	<u>1.6</u> 0.5	1.6

3.3 Analysis of Dairy Production Competencies by Selected Characteristics of Farmers

The following paragraphs summarize the major findings of this section.

- When analyzed by age, the dairy farmers 18-29 years of age had the highest total overall mean score for competence needed.
- When analyzed by years of dairying experience, the largest difference between total overall mean score of competence needed and possessed was found for farmers with 1 to 10 years of experience.
- When analyzed by the educational level, dairy farmers with more than 12 years of education had the highest total overall mean score for competence needed and possessed.
- When analyzed by the size of herd, the overall largest difference between the total overall mean score for competence needed and possessed was found for the farmers who had 50 animals or less in their dairy herd.
- When analyzed by the pounds of milk produced, the largest difference between the total overall mean score for the competence needed and possessed was found for those producing 20,001 to 40,000 pounds annually.
- When analyzed by the type of herd, the highest total overall mean score for the competence needed and possessed was found for the farmers with crossbred cows.

4. Discussion

This study was designed to determine the competencies needed for the dairy production in KCDS in Khartoum State. The findings and conclusions in this study are many and varied. The most important is that dairy farmers need more competencies in dairy production. Some competencies need more emphasis than others. The dairy farmers felt they possessed fewer competencies in dairy production than they needed. Farmers indicated they had greatest need for more competence in areas related to determining net farm income, selecting sires with high proofs and high repeatability, identifying mastitis problems and treating mastitic cows, recognizing symptoms of sick animals, following vaccination program, managing properly and adequately feeding the calf and herd replacement, and identify common parasites.

Identification of the most important competencies has implication for training programs designed to meet the needs of present and future dairy farmers in the KCDS. An evaluation of the dairy extension programs should be made to determine if those competencies are currently included in areas being taught or, if not, where they could be included. Competence needed and possessed degreased steadily with increasing age. Competence needed and possessed scores also decreased with increasing years of experience. These findings emphasize the need for education related to dairy production among the older and more experienced farmers. As years of formal education completed increased, competence needed and possessed scores also increased. These findings suggest that formal education had an influence on dairy farmers. Where the dairy farmers were compared on the basis of type of breeds, the crossbred group had higher scores for competence needed and possessed than the local breed group. A possible explanation is that farmers with crossbred cows have been recommended by dairy extension workers as a method of improving dairy production. Many farmers in KCDS work closely with the dairy extension agents and A.I. centers to take advantage of these methods.

On the five-point scale used in this study, 31 of the 35 competencies were confirmed as being needed by dairy farmers. These competencies should form the basis for instruction in young and adult farmer's classes, in dairy extension programs, and in areas of agricultural training centers as well as in other agricultural institution programs. Farm experience and dairy extension education can provide a firm background for many of these competencies. More specialized training and retraining is needed in dairy extension programs and in universities through short courses.

5. Conclusions

Based on the findings of this study the following conclusions are drawn:

1. Certain basic competencies are required in successful dairying. The most important competencies can be determined.
2. These competencies have implications for the educational programs for the present and the prospective farmers.
3. The educational programs would greatly improve the efficiency in dairy production and the quality of milk produced.
4. The educators must have more knowledgeable concerning the technology and planning programs in dairy production.

6. Recommendations

Based upon the findings of this study the following recommendations are made:

1. Dairy extension education programs should be planned and/ or revised for present and future dairy farmers to emphasize the competencies with the highest scores for competence needed and for those with the largest differences between competence needed and competence possessed scores.
2. Research should be conducted to determine the dairy production competencies of successful dairy extension agents to assist in developing additional successful dairy farmers.
3. Since most of the competencies were perceived by dairy farmers to be important, training, program should be designed to equip extension agents with these competencies in order to work effectively with dairy farmers.
4. The results of this study should be shared with the dairy farmers of the KCDS and individuals responsible for planning and providing services for them.

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