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Daily Practices and Hygiene in Dairy Farms and Groceries in Khartoum State, Sudan

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Abstract:
This study was designed to assess the daily practices and hygiene management in the dairy farms and the groceries in Khartoum State- Sudan. Two structures of questionnaires (A and B) were distributed randomly to 60 dairy farms and 60 groceries shop keepers respectively. The data collected from the dairy farms and the groceries were analyzed by using the chi-square. The results had obtained showed that, the daily practices and the general hygiene (farms and groceries) measures such as the usages of insecticides, antiseptics usages in dairy farms and periodic detection mastitis were significantly ($p \leq 0.05$) affected by the education level of the owners. In addition, the cleaning of barns, the healthy certificates produced for workers, the season that farm be more cleaned, the dead animals get rid and the periodic detection mastitis were significantly ($p \leq 0.05$) affected by the owner's job. The age grouping had significant ($p \leq 0.050$) effect on the season that farm be more cleaned. The experiences grouping had significant ($p \leq 0.013$) effect on the season that has more problems in dairy farms. On the other way, the method of get rid of abnormal milk was significantly ($p \leq 0.033$) affected by the level of education. The milk utensils carry on, the milk utensils store in and the usage of any additions to milk were significantly ($p \leq 0.05$) affected by the shop keeper's job. The shop keeper's age grouping had significant effect on the milk utensils carry on and the method of get rid of the abnormal milk. The study had concluded that the educational levels, the job and the age grouping were more factors had significant ($p \leq 0.05$) effect on the hygienic milk production in the dairy farms and the groceries. The study had recommended that the dairy cattle owners need immediate and intensive extension programs to help them to improving their herd management and adopting ideal husbandry practices.

Key words: milk utensils, insecticides disinfectants, education level and mastitis.

Introduction:

Fresh milk is considered as a complete diet because it contains the essential nutrients such as lactose, fat, protein, minerals and vitamins in balanced ratio rather than other foods (Negash *et al*., 20120; Hossain and Dev, 2013). Milk is a perishable commodity, it should be distributed quickly but in Sudan to transport milk, farmers use donkeys, donkey - trucked carts and pickup trucks depending on availability, cost and the distances involved. Typically, donkeys are used for distances up to 5 -7 km, donkey carts for

longer distances up to 15 to 20 km, and pickup trucks for longer distances. The poor transportation and distribution may affect milk quality in addition to the absence of sanitary system of milk production and refrigeration by producers and many selling centers in Khartoum State (Afrah, 2009). Milk is more widely influenced by environmental factors than any other biological fluid (Mohamed and Elzubeir, 2007). Milk as a food is an ideal medium for the growth of bacteria and if kept at above 16°C the bacteria present will multiply rapidly thereby causing deterioration in milk quality (O'Connor, 1993). Adulteration of milk can cause the deterioration of dairy products; therefore milk quality requires regulatory aspects with advanced methods of analysis and monitoring milk production (Fox *et al.*, 1995).

The education level of farmers had no significant ($p < 0.05$) correlation with the acquired knowledge regarding dairy farm practices whereas age was found to be significantly ($p < 0.05$) correlated with knowledge about period of insemination, dairy management practices, foot and mouth disease and symptoms of Age, educational level effect on dairy farmers. In addition Milk production record was found to be significantly correlated with the education level (Manoj, 2016). About 58.5% of dairy farmers were with secondary level, graduate level and post graduate level, while illiterate and primary education level represented a percentage of 41.4%. The dairy farming is an attractive and good investment for educated people (Amira, 2018).The dairy production appears to be an attractive investment for educated people with ownership, management and supervision being in the hands of the farmer (Fawi and Osman, 2013).

The age of the majority of dairy farm owners in Mosay district ranges between 30-40 years (45%), then 41-56 years old (40%) and only one respondent was above 60 years old (5%) (Abdalla, 2015).

All of the interviewed farm owners practiced hand milking. Cleaning the udder of cows before milking is important since it could have direct contact with the ground, urine, dung and feed refusals while resting. In addition, about 74.57% of respondents wash their hands and cows' teat and udder before milking and 27. 43% of respondent do not wash (Abebaw, 2018). About 74.6% of respondents wash their hands and cows' teat and udder before milking and 27. 4% of respondent do not wash, (Vissers and Driehuis, 2009; Abebaw and Ephrem 2018). The quantities that go into shops of Khartoum State in the morning are refrigerated for a short time before selling .Selling usually takes place in the evening or a service of high efficiency in milk marketing system in Khartoum State; this service is not available for producers and for many selling centers which often resulted in losses due to perish ability of the product (Mustafa, 1994). The finding that large-scale and older farmers who had more years of experience in dairy farming considered hygiene an important factor affecting milk quality agreed with findings by several authors (Pantoja *et al.*, 2009; Verdier *et al.*, 2009; and Ellis *et al.*, 2007), these authors reported that the production of high quality milk is positively correlated with maintenance of hygienic standards in the milking facilities and cow cleanliness during milking. The objective of this study is to highlight the major hygiene practices in dairy farms and groceries in Khartoum State.

Materials and methods

The present study was conducted to assess the situation of the dairy farms and the groceries daily activities in Khartoum state – Sudan. This capital city is a center of gathering many dairy farms using high yielding crossbreed dairy cattle. These dairy farms established many years ago and contributed effectively in supplying

fresh milk demand of Khartoum city consumers. The collect of data concerning the hygienic management and the husbandry practices. Two structures of questionnaires (A and B) were designed and direct interview with dairy farm owners and grocery shoppers randomly for 60 dairy farms and 60 groceries shoppers respectively. The questionnaire A had seven themes (personal information, housing management, milking management, farm management, nutrition management, health and productivity status and milk distribution and marketing) and the questionnaire B had four themes, (personal information, milk sources, milk heating and milk storage and marketing). Then the collected data were grouped, coded and analyzed using the frequencies, the descriptive statistics and the chi-square test utilizing, SPSS (version.16. 2007).

Results and discussion:

The topographic distribution of the dairy farmers showed that 15% of the farmers were uneducated, 46.7% were educated and 38.3% were graduated. Eighty eight percent were breeders and the rest are employees. Fifty percent of the farmers aged below 40 years and the others more than 40 years. About 22% experienced dairy farming less than 10 years, 38% between 10-20 years and 40% more than 20 years (Table, 1).

The results showed that the education level had significant ($p<0.05$) effect on the usage of insecticides to spraying the barns (55.6%, 75.0% and 100.0%), antiseptics to spraying the barns(11.1%, 39.3% and 65.2%) and the periodic detection of mastitis (00.0%, 14.3% and 43.5%) of (uneducated, educated and graduated) respectively had used of insecticides, disinfectants and done periodic detection of mastitis, these results had tended to increase as the level of education increasing. Educated people can easily understand the extension massages. The results are in line with Fawi and Osman (2013) and Amira (2018). Although there was no significant ($p>0.05$) effect due to education level, but it could be seen that (69.6%) of graduated farmers frequently cleaned their barns compared to (44.4%) of uneducated farmers. It could also be seen that no of the uneducated farmers had health certificate cards for their labors. The results in line with the reported by Sharma (2013).

The job of the farm owner had significant ($P<0.032$) effect on the cleaning barns. All employee frequently clean their farms and barns (100%) compared to farmers (58.5 %.) the results conforming with that reported by Abebaw (2018) the practices of the hygiene were, about (87%) of the respondents cleaned their barns on daily basis and few (9%) of them cleaned only once or twice a week. The Periodic detection of mastitis and the way farm owners get rid of dead animal were also significantly ($P < 0.05$) affected by the owner's job, about (71.4% and 71.4%) of the employees had got rid of dead animal by burning and periodically detected mastitis compared to (21.6% and 17.0%) respectively. In addition, the results showed that the job of farmers had significant ($P<0.052$) effect on the get health cards, with (57%) of the employees had produced certificates for their farm workers compared to (22.6%) of the farmers. Although there was no significant ($p > 0.05$) effect on but it can seen the employees more cared to use insecticides for their barns (100%) and antiseptics (71.4%) to spray barns. On the way there was no significant ($p > 0.05$) effect but about (100%) of the employees much attention to let their labors washed their hands before milking compared to (00.0%) of the breeders, the result not agree with that reported the cleaning of labors hands before milking about (20%) (Mohamed *et al* 2014). It is well known that employees had better perception for knowledge and they tend to seek information actively unlike farmers who receive passive information.

The age grouping (≤40 and >40) had significant (P<0.05) effect on the season that the farm be more cleaned (winter) (64.3% and 78.3%) of the said the winter is more term the dairy farm be cleaned. and the experience grouping (≤10, 10>20 and >20) had significant (P<0.052) effect on the season that the dairy has more problems (100.0%, 82.4% and 77.8%) of them said the autumn is the term that dairy farms faced problems such as poor hygiene. So this due to the hygiene an important factor affecting in dairy products. These results agreed with findings by several authors Pantoja *et al.*, (2009); Verdier *et al.*, (2009); and Ellis *et al.*, (2007) the finding that large-scale and older farmers who had more years of experience in dairy farming considered hygiene an important factor affecting milk quality

The topographic distribution of the grocery's keepers showed that the education levels include uneducated shoppers 3.3%, educated 68.3% and graduated 28.3%. Sixty eight percent of them are employees. Their age groups are ≤35 years 55.0% and >35 years 45.0% and the experiences groups include ≤6 years 41.7% and >6 years 58.3%.

From the results the educational levels had significant ($p \leq 0.05$) effect on the way how they get rid of abnormal milk, About (100%) of uneducated get rid their abnormal milk by making yogurt compared to (90%) of the graduated who tend to discard it. In spite of there was no significant effect on the milk utensils stored in but it could be seen that, about (50.0%, 85.4% and 88.2%) of the uneducated, educated and graduated farmers respectively had stored their milk in ironed equipments before selling. The results not agree with that studied by Abebaw (2018) about (88.13%) of respondents used plastic utensils and only (11.87%) of them used metallic utensils as storing and transporting utensils. Educated people were aware about the risk of using abnormal milk. On the way the rest parameters mentioned in table 2 were not significantly ($p > 0.05$) affected by the educational levels.

According to the job (breeders and employees) of the grocery's owner had significant ($p < 0.05$) effect on the milk utensils carry on (35.3% and 75.0%), the milk equipments that shoppers store their milk in (68. % and 92.7%) and the additions to milk (84.2% and 97.6%) respectively had tended to used ironed containers to carry their milk on, used ironed utensils to store their milk in before selling and had no added any additions to their milk. The rest parameters had no significantly affected by the job of shoppers.

The type of milk containers utensils (25.0% and 57.1%) and the abnormal milk get rid (71.4% and 37.5%) were significantly (P<0.05) affected by the owners (ages less than 35 years old and the ages more than 35 years old) respectively they had used the ironed utensils to receive and transported on their milk, this might be due to the used of plastic containers can be a potential source for the contamination of milk by bacteria, because it allows the multiplication of bacteria on milk contact surfaces during the interval between milking, the results agreed with (Abebaw, 2018).Younger owners <35 years much attention to used ironed containers compared to 42.5% for older ones, the results in line with (Abebaw, 2018). The age of the owners had significant (P<0.05) effect on the way they get rid of the abnormal milk. Younger owners 71% discarded the abnormal milk while 50% of the older owners convert it to yogurt (Table 2). On the other hand the experience grouping had no significant effect on all parameters (Table 2).

Table (1) Effect of education, job, age and experience on daily dairy activities

Dairy activities	Educational level			Job		Age grouping		Experience grouping		
	Uneducated (%)	Educated (%)	University (%)	Breeder (%)	Employee (%)	≤ 40 yrs (%)	> 40 yrs (%)	≤ 10 yrs (%)	10 > 20 yrs (%)	> 20 yrs (%)
Insecticides usage		χ^2 = **10.1**, P = **0.006**		χ^2 = **1.8**, P = **0.200**		χ^2 = **1.0**, P = **0.317**			χ^2 = **3.8**, P = **0.151**	
No	44.4	25.0	00.0	21.0	00.0	23.3	13.3	07.7	30.4	12.5
Yes	55.6	75.0	100	79.0	100	76.7	86.7	92.3	69.6	87.5
Antiseptics usage		χ^2 = **8.3**, P = **0.015**		χ^2 = **2.2**, P = **0.135**		χ^2 = **0.1**, P = **0.795**			χ^2 = **4.2**, P = **0.125**	
No	88.9	60.7	34.8	58.5	28.6	53.3	56.7	30.8	65.2	58.3
Yes	11.1	39.3	65.2	41.5	71.4	46.7	43.3	69.2	34.8	41.7
Barns cleaning		χ^2 = **1.8**, P = **0.411**		χ^2 = **4.9**, P = **0.032**		χ^2 = **1.1**, P = **0.284**			χ^2 = **0.2**, P = **0.908**	
No	55.6	35.7	30.4	41.5	00.0	43.3	30.0	38.5	39.1	33.3
Yes	44.4	64.3	69.6	58.5	100	56.7	70.0	61.5	60.9	66.7
Season more problems?		χ^2 = **2.6** , P = **0.626**		χ^2 = **4.6**, P = **0.103**		χ^2 = **3.5**, P = **0.171**			χ^2 = **12.6**, P = **0.0.013**	
summer	00.0	12.0	05.9	06.8	25.0	08.7	08.0	00.0	00.0	22.2
autumn	100	84.0	82.4	88.6	50.0	78.3	92.0	100	82.4	77.8
winter	00.0	04.0	11.7	04.5	25.0	13.0	00.0	00.0	17.6	00.0
Labors hands wash		χ^2 = **1.7**, P = **0.425**		χ^2 = **0.9**, P = **0.343**		χ^2 = **0.8**, P = **0.365**			χ^2 = **2.8**, P = **0.242**	
No	22.2	07.4	08.7	11.5	00.0	06.7	13.8	00.0	08.7	17.4
Yes	77.8	92.6	91.3	88.5	100	93.3	86.2	100	91.3	82.6
Healthy cards produced		χ^2 = **4.1** , P = **0.129**		χ^2 = **3.8**, P = **0.050**		χ^2 = **3.1**, P = **0.080**			χ^2 = **0.5**, P = **0.789**	
No	100	71.4	65.2	77.4	42.9	83.3	63.3	69.2	78.3	70.8
Yes	00.0	28.6	34.8	22.6	57.1	16.7	36.7	30.8	21.7	29.2
Season farm be cleaned		χ^2 = **13.0**, P = **0.222**		χ^2 = **17.0**, P = **0.004**		χ^2 = **10.5**, P = **0.050**			χ^2 = **16.2**, P = **0.09**	
summer	33.3	03.6	26.1	12.0	42.9	35.7	09.1	38.5	14.3	04.3
autumn	00.0	07.1	00.0	04.0	00.0	00.0	12.6	07.7	00.0	04.3
winter	50.0	82.1	52.2	74.0	14.3	64.3	78.3	46.2	71.4	73.9
Dead animals get rid		χ^2 = **8.3**, P = **0.080**		χ^2 = **7.7**, P = **0.021**		χ^2 = **3.1**, P = **0.214**			χ^2 = **0.9**, P = **0.923**	
outdoors	100	70.4	54.5	74.5	28.6	76.7	60.7	76.9	65.2	68.2
bury	00.0	00.0	09.1	03.9	00.0	00.0	07.1	00.0	04.3	04.5
burn	00.0	29.6	36.4	21.6	71.4	23.3	32.1	23.1	30.4	27.3
Periodic detect mastitis?		χ^2 = **9.2**, P = **0.010**		χ^2 = **10.2**, P = **0.001**		χ^2 = **0.4**, P = **0.542**			χ^2 = **0.1**, P = **0.965**	
No	100	85.7	56.5	83.0	28.6	73.3	80.0	76.9	78.3	75.0
Yes	00.0	14.3	43.5	17.0	71.4	26.7	20.0	23.1	21.7	25.0

Conclusion:

Education, job and age are more important factors that affected on the parasites and hygienic management in the dairy farms and the groceries. The experience had less influence in dairy activities and had no significant effect on all the parameters in the groceries. Training programs and extension are needed for dairy farmers. Powerful legislations should be adopted and applied for dairy sectors.

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Table (2) Effect of education, job, age and experience on groceries daily activities:

Groceries activities	Educational levels			job		Age group		Experience	
	Uneducated (%)	Educated (%)	Graduated (%)	Shopper (%)	Employee (%)	≤ 35 years (%)	> 35 years (%)	≤ 6 years (%)	>6 years (%)
Milk utensils carry on		X^2 = **3.6**, P = **0.166**		X^2 = **7.7**, P = **0.005**		X^2 = **5.6**, P = **0.018**		X^2 = **0.6**, P = **0.454**	
Iron	00.0	62.9	31.2	35.3	75.0	75.0	42.9	68.2	58.1
Plastic	100	37.1	68.8	64.7	25.0	25.0	57.1	31.8	41.9
Good mediator		X^2 = **11.7**, P = **0.166**		X^2 = **0.1**, P = **0.721**		X^2 = **0.4**, P = **0.515**		X^2 = **0.3**, P = **0.597**	
No	100	11.4	12.5	17.6	13.9	12.5	19.0	18.2	12.9
Yes	00.0	88.6	87.5	82.4	86.1	87.5	81.0	81.8	87.1
Milk utensils store in		X^2 = **2.1**, P = **0.356**		X^2 = **6.0**, P = **0.014**		X^2 = **0.0**, P = **0.971**		X^2 = **0.0**, P = **0.855**	
Iron	50.0	85.4	88.2	68.4	92.7	84.8	85.2	84.0	85.7
Plastic	50.0	14.6	11.8	31.6	07.3	15.2	14.8	16.0	14.3
Additions to milk		X^2 = **1.1**, P = **0.588**		X^2 = **3.7**, P = **0.054**		X^2 = **0.7**, P = **0.405**		X^2 = **0.1**, P = **0.726**	
No	100	95.1	88.2	84.2	97.6	90.9	96.3	92.0	94.3
Yes	00.0	04.9	11.8	15.8	2.4	09.1	03.7	08.0	05.7
Abnormal milk get rid		X^2 = **10.5**, P = **0.033**		X^2 = **3.9**, P = **0.142**		X^2 = **5.8**, P = **0.050**		X^2 = **4.1**, P = **0.130**	
Yogurt	100	32.0	10.0	28.6	30.4	14.3	50.0	20.0	08.0
Discard	00.0	48.0	90.0	71.4	47.8	71.4	37.5	53.3	88.0
Return	00.0	20.0	00.0	00.0	21.8	14.3	12.5	26.7	04.0

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الممارسات اليومية والنظافة في مزارع الالبان والبقالات في ولاية الخرطوم – السودان

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المستخلص

الدراسة صممت لتقييم ممارسة النظافة فى مزارع الحلوب و البقالات فى ولاية الخرطوم. نوعان من الاستبيان أ و ب وزعت عشوائيا ل 60 مزرعة حلوب و 60 لبائعين بقالات على التوالى. تم تحليل البيانات باستخدام مربع كاى. اوضحت النتائج ان الممارسات اليومية و النظافة العامة (المزارع و البقالات) كاستخدام المبيدات الحشرية و المطهرات و الكشف الدوري لالتهاب الضرع تاثرت معنويا بالمستوى التعليمي المربين. بالاضافة لتنظيف المحلب واستخراج الشهادات الصحية للعمال و الطرق المستخدمة في التخلص من الحيوانات النافقة و الكشف الدوري لالتهاب الضرع تأثرت معنويا بمهنة المربي. عمر المربى اثر معنويا على اكثر المواسم مزارع الحلوب تكون نظيفة. و الخبرة اثرت معنويا على الموسم الذى تواجه فيه المزارع مشاكل اكثر. بينما اثر المستوى التعليمي لاصحاب البقالات علي كيفية التخلص من اللبن الغير طبيعي. كما اثرت مهنة صاحب البقالة على انواع الادوات المستخدمة لحمل وحفظ اللبن واستخدام اضافات للبن.ادوات حمل اللبن و الطرق المستخدمة للتخلص من اللبن الغير طبيعى تاثرت معنويا بعمر صاحب البقالة.. لخصت الدراسة بان التعليم و مهنة المربى و العمر اكثر العوامل المؤثرة على انتاج اللبن الصحى فى مواقع الانتاج و التداول. كما وصت الدراسة بان الملاك على حوجة برامج التوعية و الارشاد فورية و مكثفة لتعينهم على تحسين ادارة قطعانهم وتبنى سياسات فى الاتجاه الصحيح.