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Hygienic Factors That Influence the Quality of Milk – A Review

O.A. Adebayo, J.O. Arogbodo, and T.A.M. Awoniyi
Department of Animal Production and Health, Federal University of Technology, Akure, Nigeria
Corresponding author: O.A. Adebayo;E-mail: jomilojubabe@gmail.com; Tel: +2347037908717

Abstract
The importance of milk cannot be overemphasized; as a complete food, it is paramount in the diet of man especially the infant, the sick, in particular those devoid of carbohydrate diet. As a livestock product, the safety of milk depends on the health of the animal and the factors affecting its production which include Animal shed and environment, the milker, milking equipment, water supply, feeding and nutrition factorsetc.This paper discusses these factors from the prospective of hygiene and safety for the consumers.It was concluded that ensuring on-farm welfare of these animals contributes to and is beneficial for the safety aspects of their products.

Keywords: Animal products, milk, hygiene, quality

Introduction

Livestock are domesticatedanimals raised in an agricultural setting to produce commodities such as food, fiber and labor. Livestock are generally raised for profit. Raising animals (animal husbandry) is a component of modern agriculture (Johannesen and Skonhoft, 2011). An animal product is any material derived from the body of an animal. Examples are flesh, blood, milk, eggs etc (Unklesbay, 1992). They are sources of animal protein for humans. According to the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases (Buncic, 2006). Farm hygiene is the means of protecting the farming environment by preventing the introduction and/or spread of microbes and diseases which may adversely affect livestock. Optimising the health of animals and crops increases productivity, minimises animal suffering, and ultimately protects human health by ensuring that food of animal origin are safe for consumption. Quality is a broad term, which relates to the chemical, physical, technological, bacteriological and aesthetic characteristics of milk, meat, egg and their products (Barbuddhe and Swan, 2008). This write up thus reviews the hygienic factors that influence the quality of milk.

This paper discusses these factors from the prospective of hygiene and safety for the consumers.It was concluded that ensuring on-farm welfare of these animals contributes to and is beneficial for the safety aspects of their products.

Milk and its Hygiene

Milk is an opaque white liquid produced by the mammary glands of mammals. Milk is considered as nature's single most complete food, one of the most valuable and regularly consumed foods (Girma *et al*., 2014). Milk is highly vulnerable to bacterial contamination, it is perishable. In several countries, milk safety problem is pretty common; hence, consumers prefer wholesome and nutritious food produced and processed in a sound and sanitary manner such that it is free from pathogens and chemical contaminants. For fulfilling consumer's demand, production of good quality milk and safety evaluation of milk is mandatory (Kim *et al*., 2005). The good quality milk is the one with normal chemical composition, completely free from harmful bacteria and harmful toxic substances, free sediment (Chemical residues) and extraneous substances, which have lower degree of titratable acid, good flavor, adequate in preserving quality and low in bacterial counts (Khan *et al.,* 2008). Maintaining a high standard of hygiene is one of today's most important milk production objectives. More importantly though, consumers are concerned about the safety of dairy products and the conditions under which these are produced. It is therefore critically important to ensure that high quality raw milk are produced from healthy animals under good hygienic conditions and that control measures are applied to protect human health.Milk produced under hygienic conditions from healthy animals should not containmore than 5×10^5 bacterial/ml (O'Connor, 1994).

Hygienic Factors that Influence the Quality of Milk

Animal health: In considering safety and the wholesomeness of milk, it should be noted that the dairy animal is the original source of milk and clean milk cannot be produced from an unhealthy milk animal. No amount of sanitary regulation can turn out wholesome and safe milk if the dairy animal which is the source of such milk are

diseased. In other words, milk hygiene starts from the health of the dairy animal. Accordingly, the control and eradication of diseases that affect dairy animals should be a vital part of a milk hygiene programme;therefore animal must bethoroughly examinedregularly and systemically for the presence of diseases which can adversely affect the quality of the milk. An unhealthy cow will feed less and produce less milk of poor quality. Cows should always be kept healthy and clean. Among the zoonotic diseases that dairy cow transmit to consumers include tuberculosis and brucellosis (Lore *et al*., 2006).

Animal shed and environment (Housing): The hygienic status of environmental surfaces and the various hygienic measures carried out in cattle barns are important because bio-environmental hygiene can affect milk quality (Trevisi*et al*., 2006 and DeVries *et al.,* 2012). Surface hygiene can also affect animal health (Hovinen and Pyörälä, 2011), behaviour and welfare (DeVries *et al*., 2012), and safety of the attending personnel (Kymäläinen *et al*., 2009). If milking is done inside a shed, as is usually the case with smallholder farmers, there is a high risk of contamination through the air and by insects, in particular flies. The shed should provide protection against wind, rain and excessive heat; at the same time there should be sufficient light and ventilation. The milking area of the shed needs special hygienic attention. Facilities should be created for an adequate and sufficient supply of safe and potable water. A comfortable, well-ventilated lying area encourages animals to lie down.Lighting should allow inspection of animals and provide safe working conditions. An outdoor light attached to a corral or building where animals congregate provides sufficient illumination for safety purposes (NDFP, 2013).

Milker and milking hygiene: Both the health and the hygiene of the personnel that does the milking operation influences the hygienic quality of the milk. If the personnel is sick, there exist illnesses that can be transmitted through the milk (typhoid, infections of gullet, tuberculosis, hepatitis, etc.). The health of the personnel must be checked periodically because unhygienic person can contaminate the milk with infectious microbes (Raúl, 2011). He/she should not be suffering from diseasesespecially cough and cold and should wear clean clothes, wash hands properly and cut nails periodically before milking (Barbuddhe and Swain, 2008).

Milking equipment: Milking equipment is normally designed and constructed according to recognized standards that prevent the introduction of contaminants into milk. Equipment selected for installation on dairy farms should meet recognized design and construction standards. Recognized guidelines also exist for the proper use, cleaning and maintenance of milking equipment; such guidelines should be followed to avoid transfer of disease between animals through milking equipment and ensuring production of safe milk(CAC, 2004). It is important to prevent any damage to udder and teats by milking equipment since such damage can lead to infections and consequently adversely affect the safety of milk and milk products.

Milking equipment and cans should be cleaned and disinfected regularly to minimize or prevent contamination of milk. There should be a periodic verification process to ensure that milking equipment is in good working condition. Milking equipment and utensils which are intended to come into contact with milk (e.g., containers, tanks, etc.) should be easy to clean and disinfect, corrosion resistant and not capable of transferring substances to milk in such quantities as to present a health risk to the consumer (CAC, 2004).

Water supply: Water supply is one of the most important sources of microbial contamination of processed milk; the quality of water used in the dairy farm for different purposes should be of satisfactory quality. Hence, clean potable water supply should always be available (Barbuddhe and Swain, 2008). A clean water supply is essential to minimize contamination. Milk safety can be adversely affected by the quality of water used to clean milking equipment and the milk house.

Feeding and nutrition factors: Farm animals including dairy cows can be exposed to microbial pathogens through grazing or harvested feed that has previously been contaminated by spreading untreated abattoir- and/or farm wastes (manure, slurry) containing pathogens shed in the faeces[e.g. *Salmonella, Escherichia coli* O157, *Listeria monocytogenes, Campylobacter* and protozoan parasites (*Crytosporidium*, *Giardia*)] as fertilizers on agricultural land (Hutchison, *et al.*, 2004). If cows are fed a diet that is low in forages and high in starch, the butterfat content may fall below 2.5%.Thus, a good balance of forage and concentrates is important. It is advisable not tofeed the cow with silage during milking or shortly before milking, as this will give rise to off-flavours in the milk. It is recommended that silage feed be provided two hours before milking (Lore *et al*., 2006).

Pest control: Pests should be controlled, and in a way that does not result in unacceptable levels of residues, such as pesticides, in the milk (CAC, 2004). Pests such as insects and rodents are known vectors for the

introduction of human and animal diseases into the production environment. Improper application of pest control chemicals used to control these pests may introduce chemical hazards into the production environment.Adequate measures must be taken to control insects, rodents and birds on the premises to prevent contamination.

Milk transportation, handling and storage: Milk should be stored in clean containers with a lid and kept in a cool and shady place where the danger of contamination is minimal. Transport should take place in clean containers as well. It is important to keep the transport time to a minimum and avoid violent movement of the milk. Heat, light and violent movement can all cause breakdown of certain components in the milk and affect its taste. Milk must reach the Milk Collection Centre (MCC) quickly, ideally within 2 - 3 hours after milking. Preferably, the milk is cooled to 4 ºC at the MCC and kept at that temperature until it is processed. In case chilling is not feasible, preservatives like lacto-peroxidase can be added to prolong the time before the milk gets spoiled (Pandey and Voskuil, 2011).

Conclusion

Farm animals are raised by man for a number of purposes, some of which include food (protein),income, transportation and pleasure. Therefore**,** ensuring on-farm welfare of these animals contributes to, and is beneficial for the safety aspects of their products (such as milk) which enterthe food chain. Good hygienic practices (GHP) including provision of optimal animal welfare in form of housing, feeding, water supply will enhance the animals' resistance to infections and reduceon-farm foster of food safety decline and further lead to poor growth, diseases and unwholesome milk and milk products.

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