



Herd Health Management and Animal Welfare: A Review

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ABSTRACT

Livestock is the backbone of agriculture farming and maximization of profit is one of the main interests. Success of livestock farming is mainly associated with the management of farm with respect to nutrition, housing, health and different factors related to it. Economic performance depends upon productive and reproductive performance of the animals. Herd health management is the method to prevent or eliminate diseases, improving health status, welfare and productive performance of dairy animals at farm level. Herd health management involves regular contact with the dairy farmers and collection of data and its analysis so that problems related to management, disease and production of the animal can be analyzed frequently. As a result of large scale of dairy farming and technological development, interest shifted from the treatment of single animal to control diseases in a group. The main aim of herd health management is associated with reducing the productive losses by improving management practices and the health status of the dairy animals. This includes routine farm visit, record keeping, health checkup, deworming, vaccination, treatment, claw trimming, udder health management, sanitization and biosecurity measures. Health and productivity of the farm can be improved by proper management practices and it also helpful in enhancing the welfare of the animals.

HIGHLIGHTS

- Includes routine visit, record keeping, health checkup, deworming, vaccination, treatment.
- Increased productive and reproductive performance and also profitability.

Keywords: Herd-Health, Bio-security, Udder Health, Welfare, Vaccination

The success of dairy farming is associated with the quality milk production. For improving the profitability of the dairy farm there should be focus on the production of good quality milk by ensuring a healthy herd, providing balanced ration and appropriate housing management (Noordhuizen and Cannas da Silva, 2009). Every year huge financial losses in dairy sector are due to the diseases, nutritional deficiency and reproductive problems (Mahnani *et al.*, 2015). Herd health management (HHM) involves assessing, monitoring and improving the health, welfare and production of dairy animals at farm through data analysis and monitoring of the farm (Green, 2012). This

approach is helpful in the areas with an industrialized dairy production (Alawneh *et al.*, 2018). Dairy management process involves regular visit, record and analyze data so that problems related to the animal health and welfare can be evaluated frequently (More, 2008).

Herd health management program can be applied to all livestock enterprises and can be adapted by every dairy

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farm and practices of veterinarian. The most important part of the health management program is the regular farm visits by the veterinarian for inspection of health status of the animals, milk yield and any reproductive problems. Herd health management program reduces involuntary culling of animals due to chronic lameness, mastitis and infertility and also reduces calf mortality.

Increased demands, paying capacity, health consciousness and quality control regulations changes associated with dairy sector (Barkema *et al.*, 2015). Milk production improvements are associated with housing management, nutritional management and reproductive health management in cows (Kimura & Sauer, 2015). The aim of HMM programmes is to assess and improve herd health through routine monitoring, problem analysis and preventive actions (Duval *et al.*, 2018; Svensson *et al.*, 2018).

Evolution of Herd Health Management

Herd Health Management evolved with the development of dairy sector and increasing demand of milk and milk products globally which changed the breeding policy and given emphasis to cross-breeding with high genetic potentials bulls' semen. This results higher reproductive and health problems in high producing dairy animals (DeKruif and Opsomer, 2004). So as a result of large scale of dairy farming and technological development, interest shifted from the treatment of single animal to control diseases at herd level (LeBlanc *et al.*, 2006).

Veterinary Herd Health Management

Development of dairy industry is associated with a new farming approach where attention on dairy farms has shifted from the individual animal to the herd level management (DeKruif and Opsomer, 2004). In present scenario set up of veterinary herd health management (VHHM) programs is important which includes regular health check up of the herd (Noordhuizen and Metz, 2005).

This program first started in Netherlands in 1970, where several services are provided by veterinarians as farms visits, consultancy services associated with reproductive problems, diseases, biosafety, nutrition, milk production and animal welfare (Ifende *et al.*, 2014). The aim of the programs is to increase milk production, improve health

status, control of diseases, food safety and sustainability in the environment (Gertzell *et al.*, 2021). In this program, the role of the veterinarian is entirely different, as dedicating itself more to the general management of the herds with less attention to the treatment of a sick animal (Svensson *et al.*, 2019). Role of dairy owner is very important in the implementation VHHM programs at farm (Greiner *et al.*, 2009; Ellis-Iversen *et al.*, 2010). VHHM program is also associated with the aim of farmer as some focus on productivity others on healthy herd (Bergevoet *et al.*, 2004).

In VHHM programs, the priority becomes prevention of diseases, rather than treatment of single animal (LeBlanc *et al.*, 2006). Some important practices of the VHHM programs are quality milk production, peripartum health program, biosecurity measures and reproductive health programs (Medeiros *et al.*, 2022).

Herd Health Management Process: Herd health management is a slow continuous process not a short-term response to any herd problems (Green *et al.*, 2012) and has important role in improving animal health and welfare and also productivity of the animals at the farm (Bage *et al.*, 2020).

Health Management Cycle

Identification of problems is a key step for the extent of problems at farm.

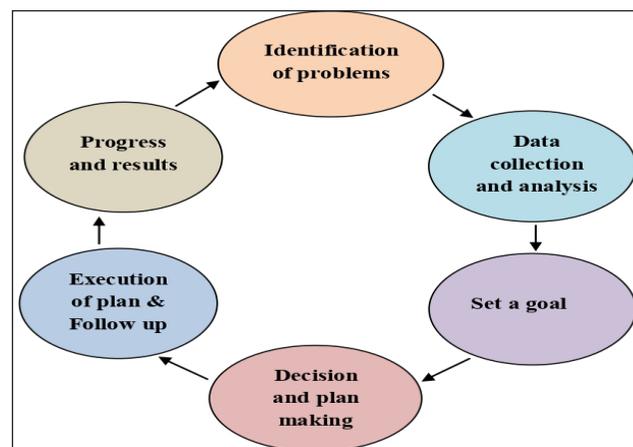


Fig. 1: Health Management Cycle

So identify major problems and collect data related to if then set a specific time-defined goal with respect to

specific problems. Decision and plan making is important for the implementation of the policies and practices to achieve the goal. Then execute the plan and quantify the actual performance in a planned and systematic way. There should be repetition of the cycle at farm routinely (LeBlanc *et al.*, 2006).

Scheduled Farm Visits

Monitoring of the herd health should be daily basis or at least once in a week. Visit should be focused on the actual problems associated with animal health and production (Sharma *et al.*, 2010). Frequency of veterinary doctor visit depends on animal's number at the farm and dairy operations. Frequent visits are required during breeding period, approaching parturition and in early lactation. This helps doctors to diagnose diseases in early stage, monitor outcome of the treatment and modify treatment protocols if needed. Frequent visits are helpful for veterinary doctors to work with dairy farmers providing farm data related to health management (Dinsmore, 2021). Incidence of diseases, clinical and subclinical cases at farm should be recorded. Routine health and pathological examination of all animals should be done and samples of faeces, urine, blood and milk should be examined for confirmatory diagnosis. Reproductive problems should be recorded and examinations are done during scheduled visits. The breeding program at farm should also analyze on economic ground and as per national breeding policy (Dinsmore, 2021).

Record Keeping

First recording system for milk production was started in Denmark in 19th century. Record keeping in dairy sector has very important role in the development of dairy sector rapidly around the world. Record keeping improves the dairy performance by more efficient management at the farm (Grisham, 2007). Various types of information should be incorporated in the records of dairy farm for a successful management. The records may vary as per the herd size, type of animals and preferences of the farmer (Chagunda *et al.*, 2006). Record keeping at most of the commercial dairy farm includes identification of animals, records of feed intake, milk production, health, treatment, vaccination, deworming, purchase, equipments, daily operations and labour records (Yadeta *et al.*, 2020). The

record keeping can be done either by manual method or computerized system for recording data at farm (Yadeta *et al.*, 2020). Animals related records like age, breed, sex, body weight, age at first calving, calving interval, conception rate, dry period, daily milk yield, per liter milk production cost, disease and reproductive or any health related problems are helpful in efficient management of the dairy farm. It has also benefit of knowing profits, managing more efficiently the income and expenses and become more confident for managing large dairy farms (Trang and Wongsamun, 2013).

System for the identification of individual animal is required in health management program. There are many methods for the identification of animals as ear tagging, branding, unique identification number or radio frequency identifications (RFID). Data related to individual animal like age, breed, sex, body weight, daily feed intake, deworming, vaccination, treatment, productive and reproductive parameters should be recorded. It helps to learn about individual animals and making action plan for the whole herd. Record keeping must include data related to productive and reproductive performance and also disease incidence which can be assessed by others for management.

Applications for herd health are designed for improving livestock productivity by feeding management, general husbandry practices, disease control strategies, vaccination, disease surveillance and environmental management (Renita and Harold, 2019).

Dairy Farm Biosecurity

Bio-security is defined as the measures used to prevent the entry of pathogens at farm and also spread diseases from one animal to others. It can be also defined as a set of managerial practices to prevent entry of causative agents to dairy farm (external biosecurity), spread inside the farm (internal biosecurity) (FAO, 2010), and spread of diseases outside the farm have an adverse effect on the human health and environment (Tatiana, 2017). Biosecurity is crucial to control the entry or spread of many diseases within animals at dairy farm (Denis-Robichaud *et al.*, 2019). Biosecurity practices regular testing of the herd, quarantine, testing of purchased animals, disinfection, hygiene and prohibited entry of outsiders to the farm (Sarrazin *et al.*, 2014). Biosecurity measures improve the



health and welfare of the herds (Barkema *et al.*, 2015; Oliveira *et al.*, 2017) and also productivity of the dairy farm (Postma *et al.*, 2016a; Moya *et al.*, 2020). The vaccination program for the prevention of diseases can also be included in the biosecurity measures. It is seen that dairy farms with strict and effective vaccination program have higher milk productivity, and better reproductive health (Renault *et al.*, 2018). It is also observed that higher biosecurity reduces the use of antibiotic at farm (Postma *et al.*, 2016b).

Preventive Measures Against Infectious Diseases

Prevention of diseases entering and spreading in herd is the most important and effective way of managing diseases (Wobeser, 2002). In case of disease outbreak, proper measures should be followed to prevent the spread of pathogens (Costa and Akdeniz, 2019). Investigation should be made following an outbreak of disease (Sharma *et al.*, 2010). Zoonotic diseases may communicate from animal to human beings or vice-versa so it should be taken care of. Minimize the contact of diseased animals to healthy animals by preventing the animal movements in high risk areas (Sharma *et al.*, 2010).

Quarantine period

Quarantine is a strict isolation of newly introduced animals or disease exposed animals from healthy one to prevent spread of diseases. Quarantine period may vary depending on the potentiality, infectivity and also incubation period of the causative agent (Sharma *et al.*, 2010). Normally quarantine period is of 40 days during which, the animal are screened out for parasitic diseases and deworming is carried out by oral anthelmintics, dipping or spraying. The aim of quarantine is to prevent or control the spread of diseases, save people from exposure and maintain the health of new procured animal.

Isolation of sick animals

Isolation stands for the separation of apparently healthy animals from diseased or suspected for any contagious disease. Sick animals must be kept isolated from healthy herds and special care should be paid to observe symptoms of sick animals. Isolation of animals helps to prevent disease spread and to reduce physiologic and behavioral changes due to disease (Arndt *et al.*, 2010).

Precautions during medications

Animals should be restrained properly at the time of giving medicine orally otherwise chance of drowning pneumonia. Injectable medicines are given only by properly sterilized syringe and needle with proper route (Sharma *et al.*, 2009).

Disinfection of animal houses

Disinfection is an important measure to control infectious diseases in livestock farm (Sharma *et al.*, 2009). Normally sun light kills bacteria and other germ causing diseases and it is said to be the best disinfectant. But in case of disease outbreak disinfection of farm is required. Floors, walls and every corner, mangers, water troughs and equipments of the dairy farm should be disinfected by bleaching powder, sodium hydroxide or sodium hypochlorite.

Disinfection of pastures

Like animal houses pasture should also be disinfected and remove the infective materials as carcass, aborted fetus or feces. Pasture should be ploughed at least in every six month which helps in the disinfection of the land by sun light.

Vaccination in farm animals

Vaccination helps in the control of infectious disease at dairy farms (Atkins, 1999). Vaccination is the most effective methods for disease control which increases productivity in animals, and reduces disease spread especially zoonotic and food borne (Roth, 2011). Vaccination helps in the development of immunity in animals against specific infectious diseases through the injection of biological agents. Vaccine contains antigen which is a live attenuated or dead pathogens i.e. virus, bacteria or fungus produces of active immunity in the animals. Vaccination is a very effective method in the control of animal diseases. It is generally safe, effective and less side effects. Vaccination should be done at farm at regular intervals against frequently occurring diseases. We should follow vaccination schedule from the birth of the calf. We should not vaccinate unhealthy animals, stressed animal or animals in poor body condition. Vaccination reduces antibiotics use for the treatment of diseases at

dairy animals. Vaccination is helpful in the reduction of antibiotic resistance by decreasing extensive use of antibiotics in the treatment of diseases (Singer *et al.*, 2003). Mass immunization is helpful to control the infectious diseases; and viral and bacterial diseases can be effectively controlled by mass vaccination (Sharma *et al.*, 2010). Mass awareness program related to various infectious diseases, their mode of transmission and effective control are very much helpful to control diseases (Sharma *et al.*, 2010).

Notification of infectious diseases

Information must be conveyed throughout the country in case of any outbreak of infectious diseases, by the help of mass communications such as radio, television and news paper (Sharma *et al.*, 2009).

Carcass Disposal

Carcass disposal is done by several methods as burning, incineration and burial (Blake, 2004). The important thing in carcass disposal is the cost affectivity, safety and environmental pollution (Casagrande, 2002). There should be considered the comparative costs of disposal by different methods and availability of resources for disposal.

Burial method

Burial method is the most important method of carcass disposal. It includes disposal of the carcass in trench, graves, or pits called mortality pits (Freedman and Fleming, 2003). Depth of the pit should be sufficient that the upper part of the carcass must be 1.5 m below the ground. Along with carcass bedding materials, feed, excreta and soil in contact with dead animal should also be buried. Carcass should be covered with burnt lime and layered with soil, dirt and rocks. Burial site should be away from underground electrical wires, gas and water pipe lines, water wells and septic tanks.

Burning method

Burning method is the most sanitary method for disposal of carcass. The burning site should be away from the public reach, society, buildings, hay or straw stacks, electric

cables or pipes. In burning method trench having depth at least 0.5 m, shallower at the ends, and size should be as per the carcass's size. Trench is first filled with iron bars and wood, and the carcass placed on it. Sufficient quantity of combustible materials is used in this method to convert into ashes. We should ensure to remove and safely dispose the feed and debris then disinfect the building and equipment by chemical means (Sander, 2022).

Control of Parasitic Diseases

Parasitic diseases are the major problems as par as health and welfare of animals concern worldwide. Parasitic infestation of digestive tract like helminths has negative impact on animal productivity (Luscher *et al.*, 2005). It causes a huge economic loss in term of morbidity, mortality, decreased production, reduced growth rate, decreased fertility and increased treatment cost (Sahoo *et al.*, 2002). The control measures for parasitic infestations are helpful in minimizing the productive and reproductive losses in dairy animals (FAO 2001). A good management practices can control parasitic diseases to minimize economic losses. Proper dose of anthelmintic should be given as per the weight of the animal and parasitic load to prevent drug resistance in animals. Under dosing is also responsible for the development of resistance. It should be avoid the frequent use of anthelmintics in animals and also avoid long term continuous use of same anthelmintic (Maqbool *et al.*, 2016).

Ectoparasites like ticks, mites and lice are the vectors of several bacteria, virus and protozoa and transmit diseases in animals and humans. They may cause a great economic loss by both direct and indirect ways. Ectoparasites directly harms by blood sucking, inflammation, skin damage, pruritis and allergy and indirectly by disease transmission, self-wounding, and social nuisance to the animals (Tadesse *et al.*, 2011; Senbeto, 2022). There are three main chemical groupings used for the control of ectoparasites as organochlorines, organophosphates and synthetic pyrethroids (Natala and Ochoje, 2009). Other commonly used chemicals are carbamates, triazines, formamidines, benzyl benzoate and pyrethrin (Taylor *et al.*, 2007). Now a day's avermectins has been used and found effective against a range of ectoparasites (Senbeto, 2022).

Housing Systems for Dairy Cows

Housing management has also very important role in ensuring the udder health and prevention of diseases in cows (Leso *et al.*, 2019). One of the best ways to utilize full genetic potential and obtain maximum production from a dairy animal is to provide good environment like thermo-comfort zone. Animal welfare is somewhat more than the feeding, care of animals and maintaining good health. It should be a balance among housing, feeding and general care as per the need of animals (Noordhuizen, 2012). Animal comfort and welfare are directly associated with the productivity and profitability of a dairy farm (Villetaz Robichaud *et al.*, 2019).

Floor system for dairy cows

Floor of an animal house is very important as slippery floors make animals act more carefully, which affects movement, general activity, social and sexual behaviors (Telezhenko *et al.*, 2017). Slippery floor increases the risk of falling down, severe injuries, fracture and even death in some cases. So it should be take care of if floor becomes slippery by grooving (Phillips and Morris, 2001). Grooving of the floor increases the friction and reduces slipperiness. If the floor becomes more abrasive there may be over wearing of claws (Bergsten *et al.*, 2015).

Udder Health

Udder health program is very important and it should be specified, which includes mastitis therapy in dairy animals, housing and nutritional management, milking procedure and health status (Kromker and Friedrich, 2009). The monitoring of the dairy processes is required for improving and maintaining udder health of the animals as regular checking of somatic cell count and bacteriological investigation of clinical mastitis cases (Jansen *et al.*, 2009).

Milk quality is associated with udder health and characterized by somatic cells count and composition of milk (Cinar *et al.*, 2015). Mastitis causes huge economic losses in term of decreased milk yield in current and subsequent lactation, poor milk quality and increased treatment cost (Horvath *et al.*, 2017). There should be a hygienic milking which ensures better milk quality and lower values of somatic cell count (Sant'Anna and

Paranhos da Costa, 2011). Certainly increased productivity is associated with increased profitability, but it may also cause decreased udder health, fertility and higher culling rate (Gussmann *et al.*, 2019; Krpálková *et al.*, 2019).

Lameness

Lameness is one of the most prevalent cases at dairy farm which causes large economic losses, reduced productive and reproductive performance, and also animal welfare (Moreira *et al.*, 2019). Lameness is associated with lower body condition score and animal welfare, which can be reduced by regular claw trimming (Sadiq *et al.*, 2021). It is seen that animal mobility increased by regular claw trimming and prevent lameness.

Claw Trimming

Functional claw trimming

Functional claw trimming is the method used to restore function of the foot by trimming overgrown claws to its normal shape and size (Bell, 2009). It should not be done just prior to calving and trimmed on the day of drying off. Trim cows with highly sensitive claws only (Jan *et al.*, 2015).

Curative claw trimming

Curative claw trimming is done to treat claw lesions. Claw trimming is essential in case of poor hind leg conformation, hoof deformities and lameness (Bell, 2009). Any delay in claw trimming makes the situation worse and results into lameness. Claw trimming frequency should be every 4-6 months. There should be more frequent trimming in older cows and in repeat cases (Noordhuizen, 2012).

CONCLUSION

Herd health is an important aspect for dairy farmer as it influences the farm's income, costs and technical efficiency. Herd health management has very important role in minimizing the productivity losses caused by disease and welfare of the animals. The aim of the herd health management program is to control or eliminate diseases affecting dairy animals that have a significant impact on animal productivity and milk quality, and also

human health. In herd health management we do not focus on one disease or animal but focus on the herd as a whole for disease prevention, productivity and reproductive performance.

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