Knowledge of a milking robot operation

S. Kovac, J. Divis & J. Svenkova

Department of Animal Husbandry and Food Production Mechanization, Faculty of Agricultural Engineering, Slovak Agricultural University, Trieda A. Hlinku 2, 949 76 Nitra, Slovak Republic
E-mail: stefan.kovac@uniag.sk, svenkova@mech.uniag.sk, selekta@iol.cz

Introduction

In the field of milking technology there is a continued and systematic development of automatic milking systems (AMS). The present-day conceptual solutions of automatic milking systems (AMS) differ in the number of milking boxes being attended by a single equipment, by technical solution of setting on teat cups, by solving management systems.

Materials and methods

New items of knowledge and experiences gained from operating two dairy robots, make LELY ASTRONAUT, are presented in this paper. About 120 cows were milked by means of milking robots. Investment costs to purchase milking robots represented nine million Czech crowns. Building costs amounted to fifteen million Czech crowns.

LELY – ASTRONAUT consists of the following components:
The milking box - with a pneumatic control, a door, a feed components feeder, electronic equipment for recognising cows, guiding frame for the robot arm, the robot arm with laser system to determine position of teats, the system for cleaning teats and the equipment for setting on teat cups and discharge equipment.

The milking equipment - consists of a vacuum pump, teat cups and cups with an independent milk pipe liner for each quarter, automatic pre-milking equipment with milk separation, a vessel with measuring instrument to measure the total quantity of milk drawn, sensors to measure vacuum height, electric conductivity of milk, milk flow for particular quarters of the teats, device for automatic scanning of teat cups, a milk pump, a device for milk separation, a device for taking milk samples and a system for teats disinfection.

The electronic process management system – subsystem for conducing all the moves of the robot arm of the system of milking, udder cleaning system and the system for taking a milk sample, subsystem for electronic recognising of cows and feeding of feed components, subsystem for

determination of milk quantity drawn, electric conductivity and milk flow, personal computer with a printing machine with management programme and alert system.

Other components – cleaning equipment to clean the parts through which the milk had flown and a pneumatic system to control doors.

Results

The evaluated milking robots were introduced into operation in November 2003. No serious defects occurred since they were introduced into operation.

About 50% of costs expected to be imposed on veterinary care have been saved as a result of implementing milking robots into this technological system.

An important contribution of this system is that dairy cows efficiency has increased by about 15% compared to classical milking. In the first operation year efficiency reached 28 litres of milk per day and head. Selekta Pacov joint-stock company paid a high attention to its running in. After putting milking robots into operation, when entered, the dairy cows had to accustom themselves to a milking box. After one week of operation as many as 50% of cows entered the milking box by themselves and approximately after one month nearly all the cows entered the milking boxes without any problems.

From the experiences obtained it is convenient for dairy cows to be transferred from other method of milking to a milking robot immediately after calving. To milk, mainly primiparas, by means of robots proved to be good. Milk is acquired from each quarter independently. After individual quarters have been stripped, the teat cups are disconnected automatically by which mammary gland is not burdened for a longer time than it is necessary. After taking the last teat cup away, the disinfection of teats by a special nozzle is carried out. The disinfection preparation is atomized by whirling effect. Milk quality is controlled by sensors. If the colour does not correspond with the normal, it is separated. In case of any change or unusual matter being occurred, the operation is warned by the computer monitor. The milking robot was visited 2.5 times by dairy cows throughout the day.

Conclusions

By introducing robotized milking (AMS) in the evaluated dairy cow farm was decreased the need for human work, it was possible for the dairy cows to chose the proper time of milking, the number of milking. The quality of milk obtained increased and performance of dairy cows increased by 15%. Health condition of the mammary gland improved, with veterinary costs being decreased by one half.

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