

## HALF-OPENED SHELTERS WITH MILKING-ROBOT FOR DAIRY COWS IN FREE ACCOMODATION

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**Key words:** shelter, free accomodation, milking robot

**Abstract.** The free accomodation system for dairy cows, without the constraints imposed by the tie system, offer the moving possibility for each animal in the proper space limits in order to assuring the rest, the circulation, the foraging and the watering. The technics development lead to the mechanization and to the automation of some production processes intended to facilitate the farmers work. So, it is imposed the interfere also in the accomodation system when we design the new investments. The milking centralization is one of the tools that can make more efficient the milk production, concurring to the increasing of the work productivity, to the decreasing of the concentrates consumption, to a good hygiene, and to the udder health.

### INTRODUCTION

The paper present two constructive types for the dairy cows free accomodation, where the resting area is in pens, the foraging is free (with unique forage), the mechanical manures disposal is done with surface rake blades and the milking with the milking robot. We choose the milking automation type taking into account the fact that the farms number in witch this system is applied increase. In the last decade the producers have announce 1000 robots sold in the countries with advanced zootechny.

### PROJECTS PRESENTATION

The scarceness of the investments founds of the farmers in our country lead us to conceive this shelters with a relatively small number of the places: 138 in the first variant (fig.1) and 178 in the second one (fig.2), with extending possibilities by extending the bays number.

In both variants, the resting place is in pens, on four rows parallel with the longitudinal wall, their length and width being in relation with the animals dimensions, and affecting the alleys dimensions. Nearby the resting pens is placed the waterings and the scratchings brushes. In the cows precinct we have placed mobile doors to separate the lactation cows from the others cows, finded in different physiological states.

The unique forage is placed on a large alley (4.00-6.00m, depending to the space occupied with pens). To the manger length dimensioning the individual foraging front is not respected because we consider that not the animals are in the same time to the manger.

The rake blades placed on the circulation alleys are automatised, easy programable, with sensors, capable to avoid the accidents. The submersible motors offer the possibility to mix, to homogenyse and to cut the big parts and by pumping the manures are easilly disposed. This system permit to have in the shelter a permanent cleaning with benefic effects on the animals health.

The waterings from stainless steel, placed on the pens extension, have protection bars to avoid the water contamination and the waterings deterioration.

The mechanical or electrical scratchings brushes are placed also in the pens extension. These are preferred by the animals, offering a comfort state, longevity and thus the milk production is increased. In both cases the milking is automatised. In the variant I (138 places) the milking robot is placed at a shelter's end and in the variant II in the shelter's middle, the animals having the access from the both directions. It can be observed the fact that the milking robot is placed between the resting area and the foraging area.

We have the possibility to choose a single box or more boxes, place where the cows have a voluntary or controlled access (fig.3).

An alternative was to place the automatical system on a rotative platform, with fixed milking time, place where the cows access is controlled (fig.3 and fig.4). The most used are those with individual boxes. We choose a robot with three boxes (in the both variants) taking into account the interior dimension of the shelters.

A single robot can be used for 2-4 boxes, with the following productivities: for two boxes can assure the milking of 7-11 cows per hour, that is 200-270 milkings/day, and three boxes 10-14 cows, i.e. 260-350 milkings/day.

In figure 4 we present two variants for the cows accommodation, with details of the milking robot accessing. The cows must pass by milking robot to get the foraging area. There are also the identification zones, where the intelligent doors lead the cows to the milking, to the foraging area, passing or not through the treatment and insemination zones. The automatical leading equipments permit the easy access of the cows to the milking area. The data concerning the milk productions, the milking frequency are recorded and automatical analysed once with the behaviour and health problems. The udder cleaning system is part of the milking unit, sometimes can work independently.

The milking session speed, the conductivity, the milking time is measured for each udder quarter, are recorded in the database and processed. The udder health is harder to pursue because the visual control of the milker does not exist.

## RESULTS, CONCLUSIONS AND DISCUSSIONS

The locating of the shelters perpendicular to the dominant winds direction, lead to active ventilation. The frame resistance structure from wood, concrete or steel can have two or three intermediary openings, with bays at 6.00m, respectively at 4.00m. The intermediary columns position along the manger or/and between the rows of head to head pens do not disturb the technological processes.

The milking system has the following characteristics: a good exploitation of the cows genetical potential, the reduction of the manual work, the production costs reduction, it is recorded all data concerning all cows, it is assured the permanent control and overseeing of the cows, the computerised productions offer the possibility to apply an appropriate management and thus, the production rhythm is no more affected by the work steps of the implied personnel, the natural foraging rhythm of the animals tend to be a decisive factor in the milk production increasing, the milking time is reduced, so the social impact of the families implicated in the animals exploitation is great, the milk quality and quantity, the health state are also increased.

These conclusions present the benefits of the free accommodation system corroborated with the milking robot utilisation.

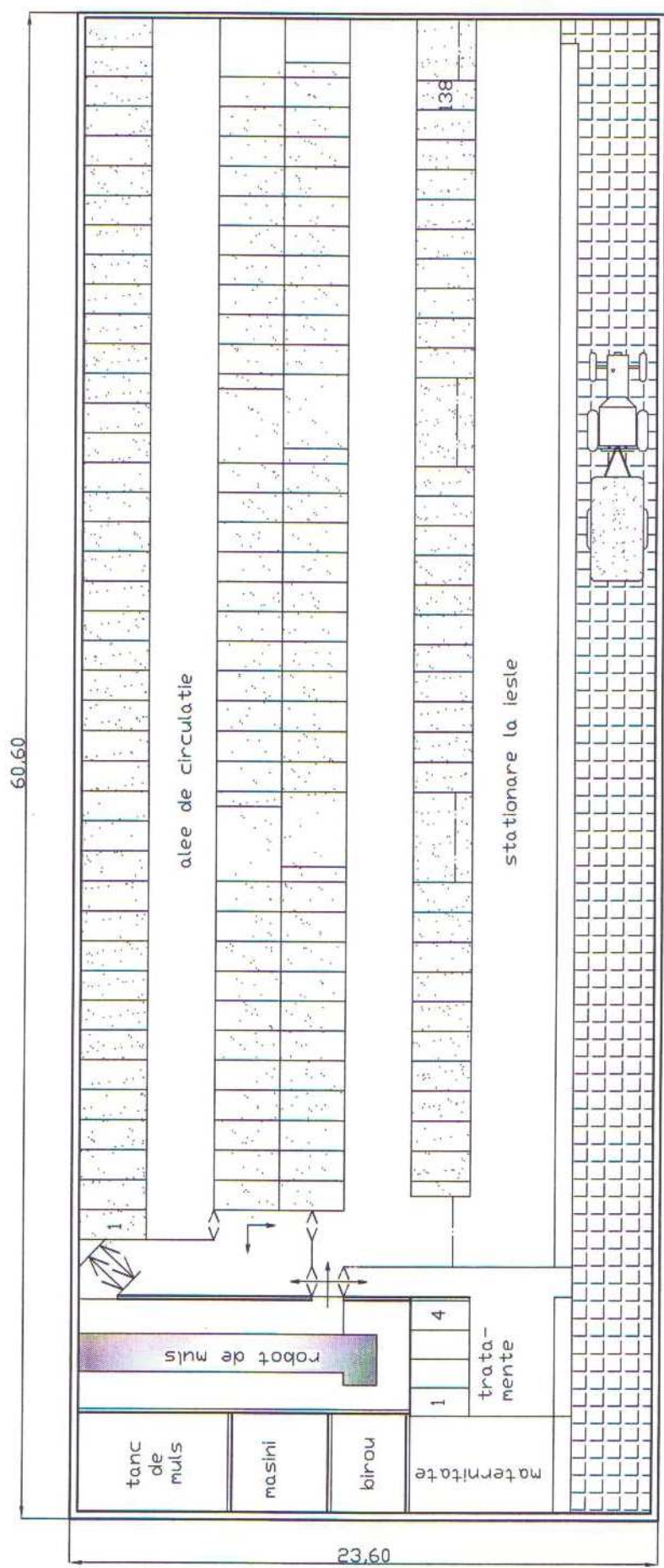


Fig. 1 The project of a shelter with milking robot for 138 dairy cows

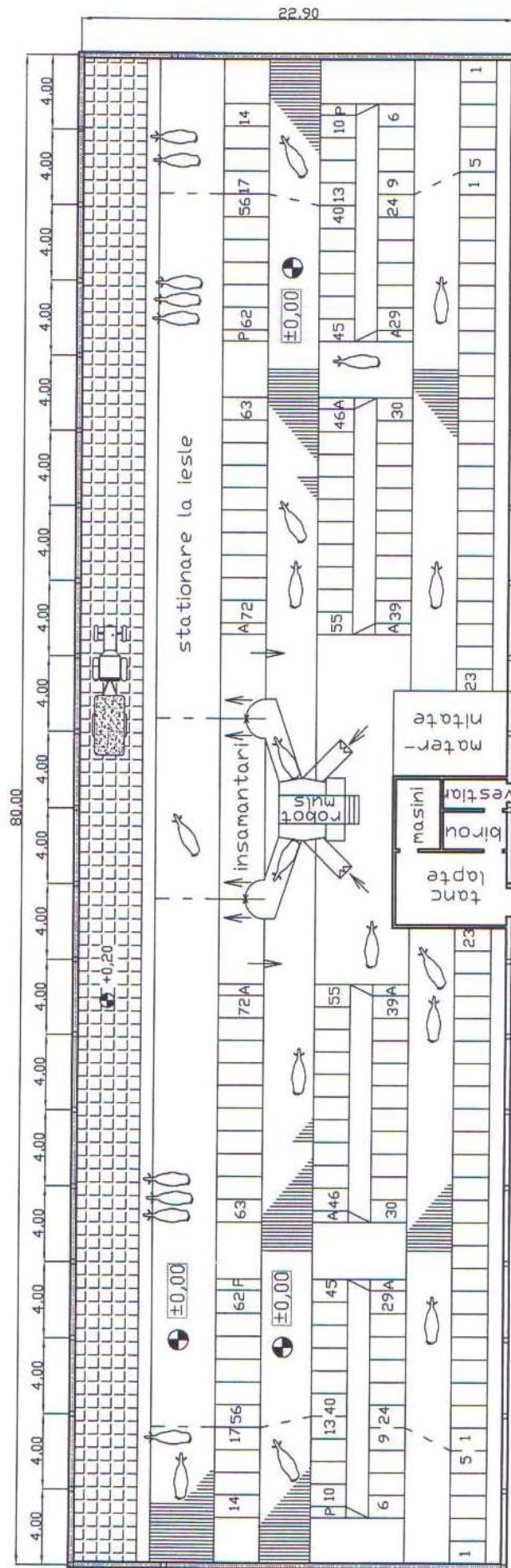


Fig. 2 The project of a shelter with milking robot for 178 dairy cows

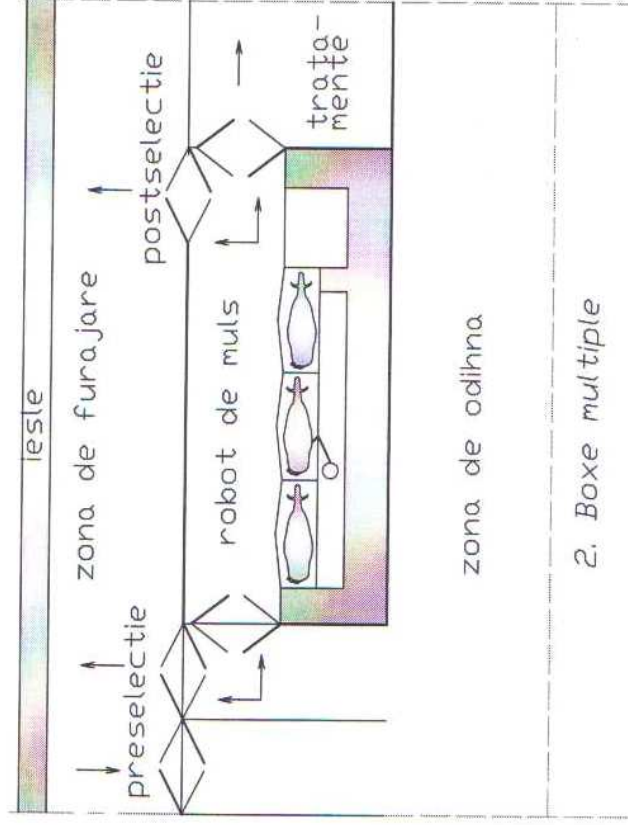
### Necesar utilați:

1 robot pentru 2-4 boxe

### Productivitate:

2 boxe	7-11 vaci/h	3 boxe	10-14 vaci/h	4 boxe	14-18 vaci/h
200-270	mulșuri/zi	260-350	mulșuri/zi	320-400	mulșuri/zi

Caracteristici:  
 acces controlat  
 16 locuri pe platforma  
 100 vaci /ora



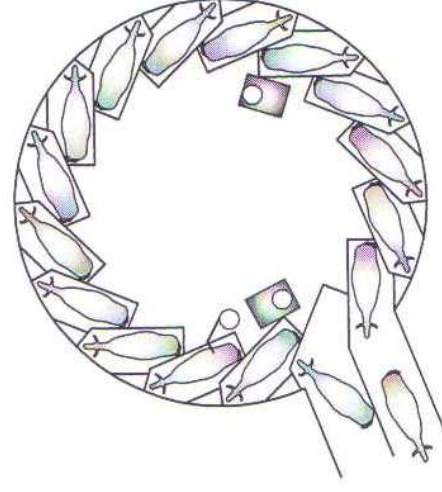
Necesar utilați:  
 un robot pe boxa

Productivitate:

6-8 vaci/ora  
 150-170 mulșuri /zi



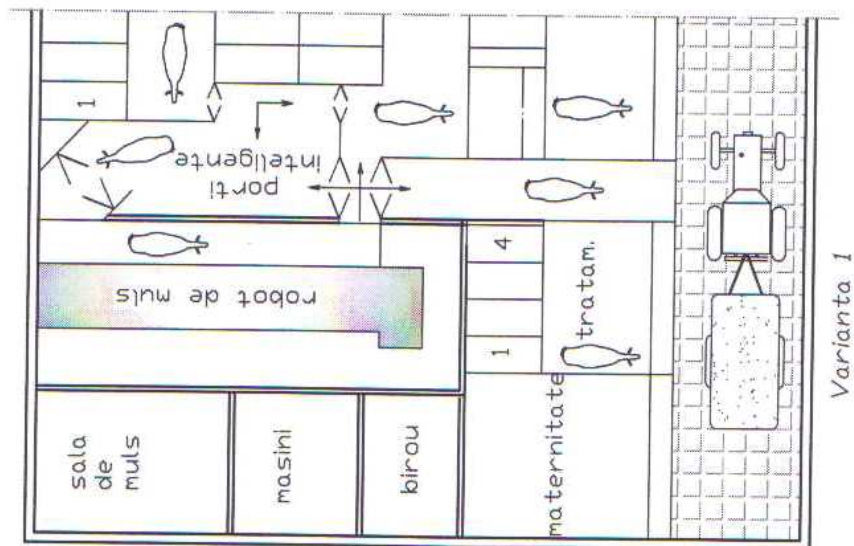
1. □ singura boxa



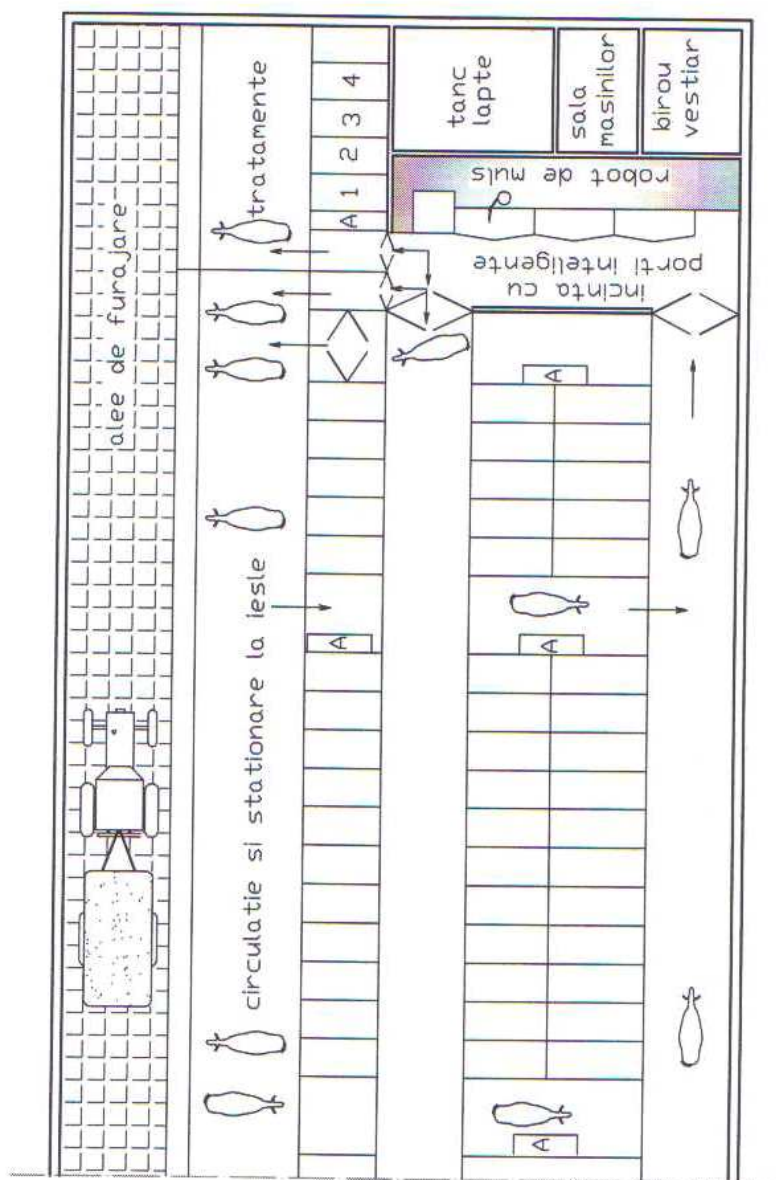
3. Sistem circular

Fig. 3 The automatically milking systems.





Variantă 1



Variantă 2

Fig. 4 The access to the milking robot.

We recommend the shelters without walls, with tarpaulin (curtains walls). Although the cows eat more forage, the system is viable ( the heating stress appear over +20°C and the colding stress under –25°...-27°C). The system can be composed by a single tarpaulin wich is placed at the base or at the height middle. This tarpaulins are executed from resisting materials on an aluminium skeleton, are doubled with a wind dissipating mesh ( wind screen) against the birds. In comparation with the shelters with termical insulated walls, the shelters with mobile shuttings are cheappers, can assure a proper microclimat and a proper protection of the wood structures against the bacteries.

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