



Fundamentals of milk production

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Types of milking



Machine

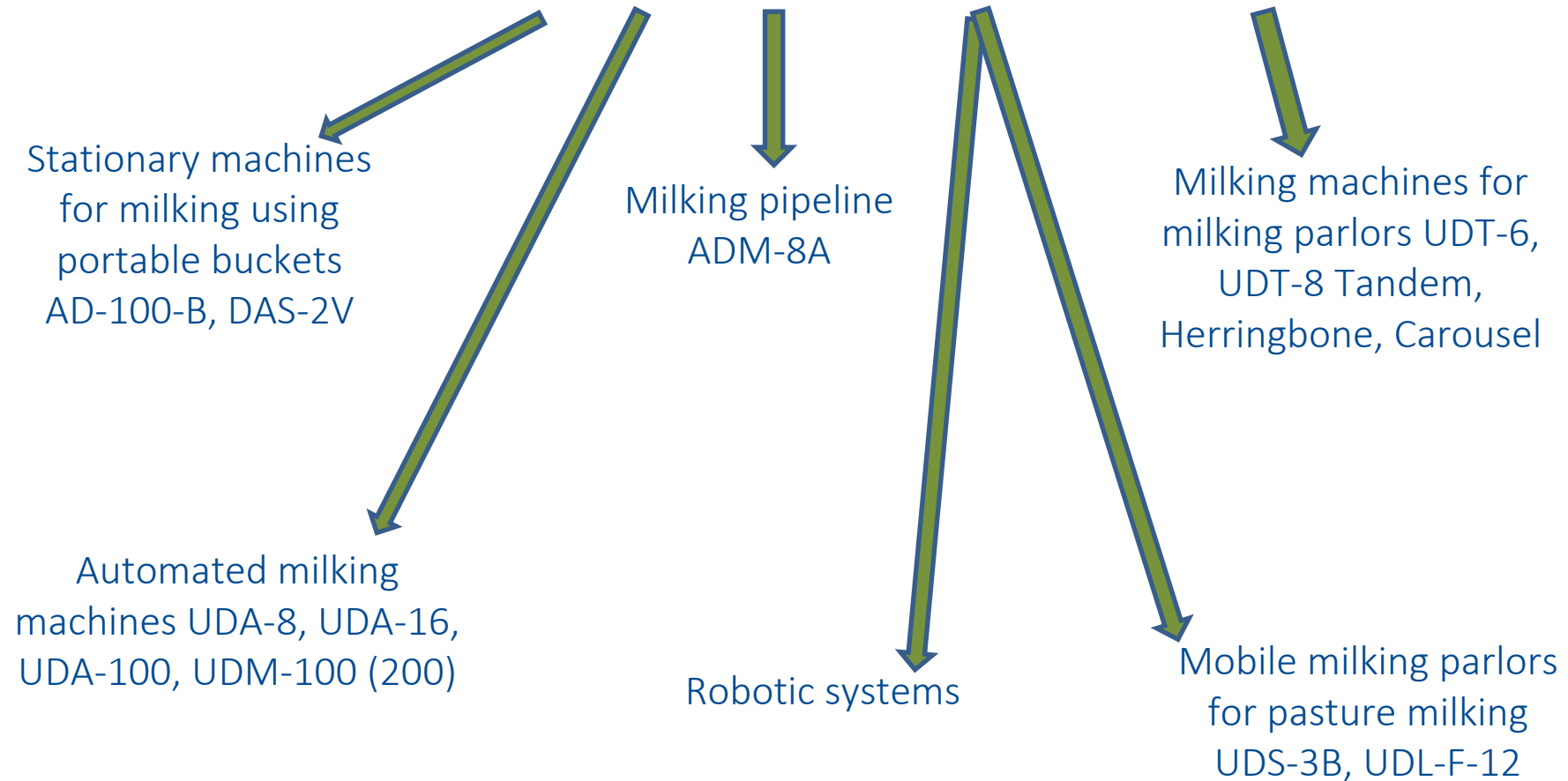


Manual





Classification of milking machines used in cows



Individual milking units



Milking machines for cows AID-2



Milking machines for cows AID-2-01 (Victoria)



Milking machines for cows AID-2-03 (Duet)



Milking machines for goats AID-2-04 (Koza)



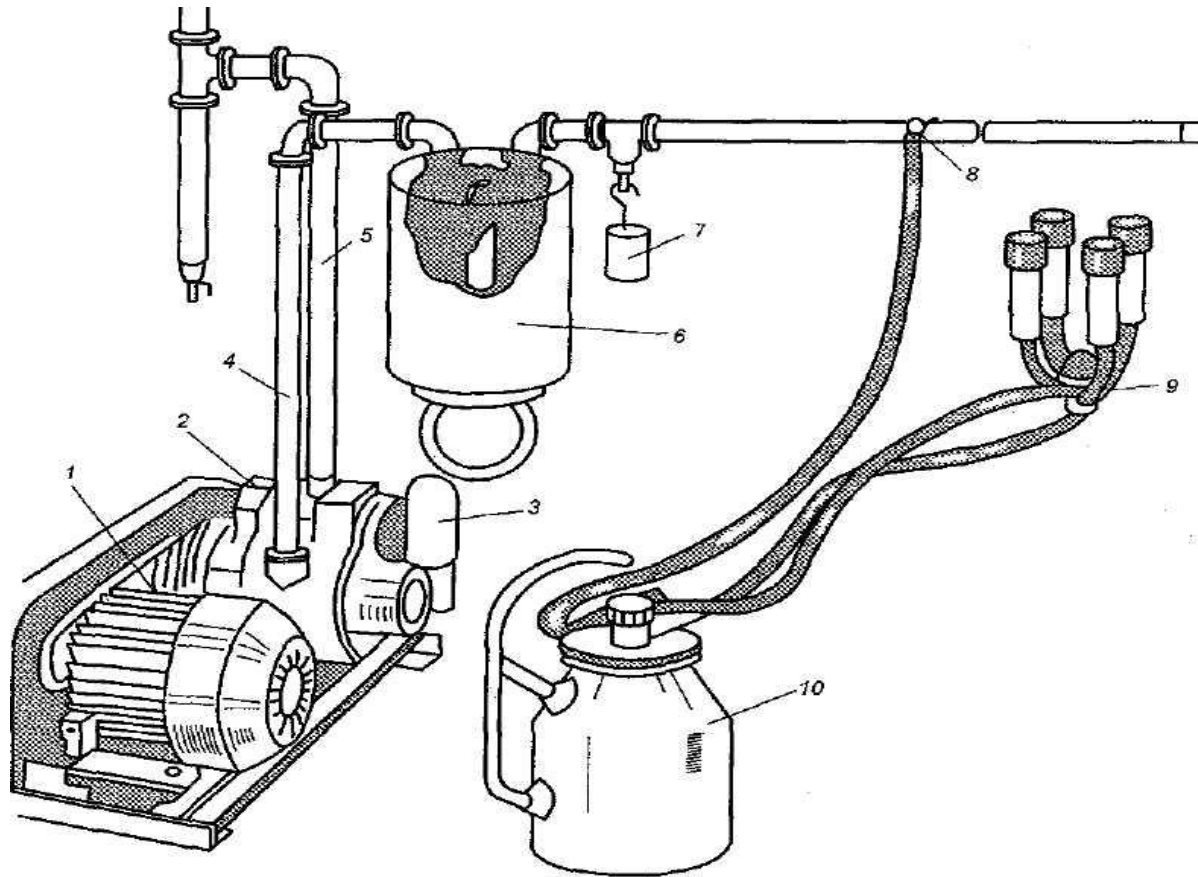
Milking machines for cows AID-2-06 (Udarnitsa)



Milking machine for cows AID-2 Mini



DA-100 milking machine:



- 1: electric motor;
- 2: vacuum pump;
- 3: drip lubricator;
- 4: vacuum line;
- 5: exhaust line;
- 6: vacuum tank;
- 7: vacuum regulator;
- 8: main line;
- 9: milking machine;
- 10: milking bucket.



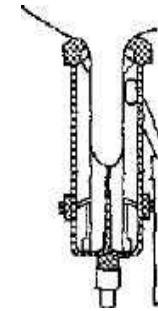
Milking machines operate in cycles, with two or three consecutive steps: sucking, squeezing, and rest.

The period during which these 2–3 steps are performed is called pulsation, or the working cycle of milking.

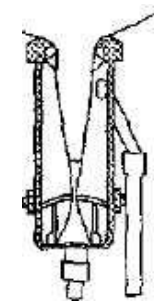
Depending on the number of steps per cycle, domestic milking machines are classified as:

- two-step (DA-2 Mayga, Stimul, Impulse);
- three-step (DA-3M, Volga).

Two-step milking

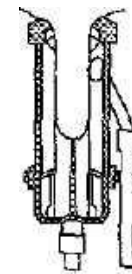


Sucking



Squeezing

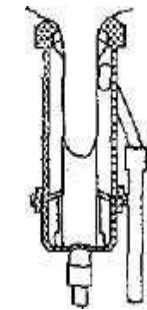
Three-step milking



Sucking



Squeezing



Rest



Characteristics of domestic milking machines

| Parameter | Volga | DA-2 Mayga | M-59 Impulse |
|-----------------------------|------------|------------|--------------------------------|
| milking principle | three-step | two-step | Two-step with pairwise milking |
| Operating vacuum, kPa: | | | |
| when milking using a bucket | 50.6–53.3 | 48.0–50.6 | 48.0–50.6 |
| during pipeline milking | 59.9–66.6 | 53.3–59.8 | 57.3–64.0 |
| Ratio of steps in time, % | | | |
| sucking | 64 | 70 | 54 |
| squeezing | 11 | 30 | 46 |
| rest | 25 | – | – |
| Pulsation rate per minute | 60 (50–70) | 80 (70–90) | 45–55 (pairwise) |
| Inner diameter of liner, mm | 23 | 22 | 23 |
| Liner length, mm | 155 | 155 | 180 |

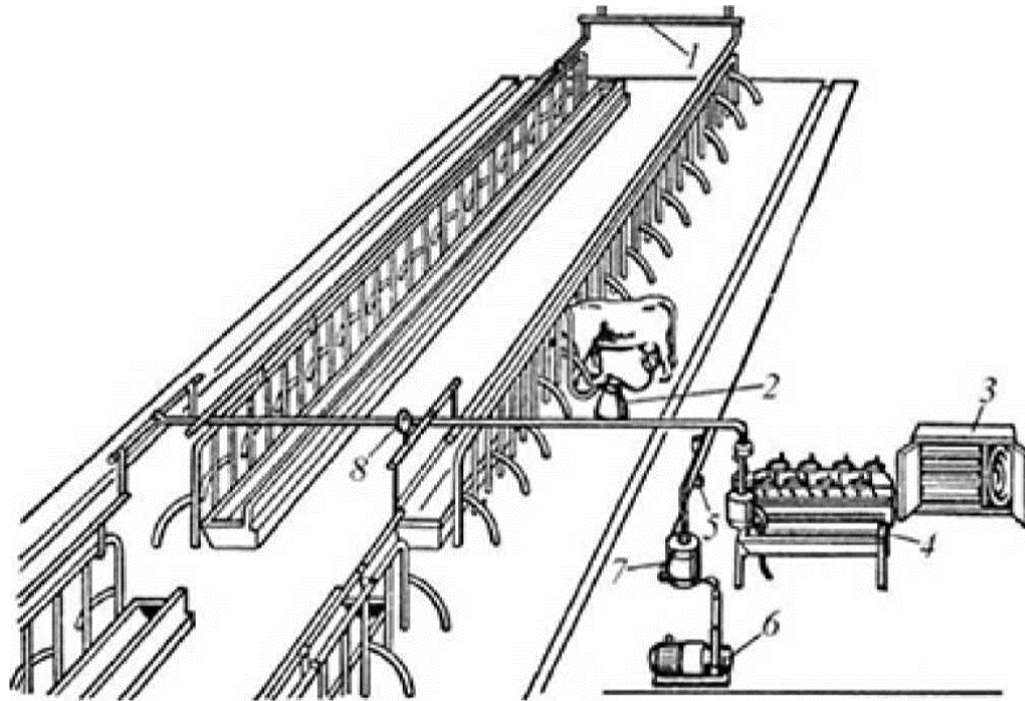


Characteristics of milking machines used in tie-stall housing

| Parameter | AD-100B | DAS-2V | ADM-8A-1 | ADM-8A-2 |
|--|---------|--------|----------|----------|
| throughput, heads per hour | 70 | 68–76 | 56 | 112 |
| number of cows | 100 | 100 | 100 | 200 |
| number of milking machines | 9 | 8 | 8 | 16 |
| number of maintenance personnel, persons | 3 | 4 | 2 | 4 |



Stationary machines for milking using portable buckets



Bucket milking machines (AD-100B; DAS-2V):

1: vacuum line;

2: milking machine;

3: storage cabinet for liners and spare parts;

4: machine washing unit;

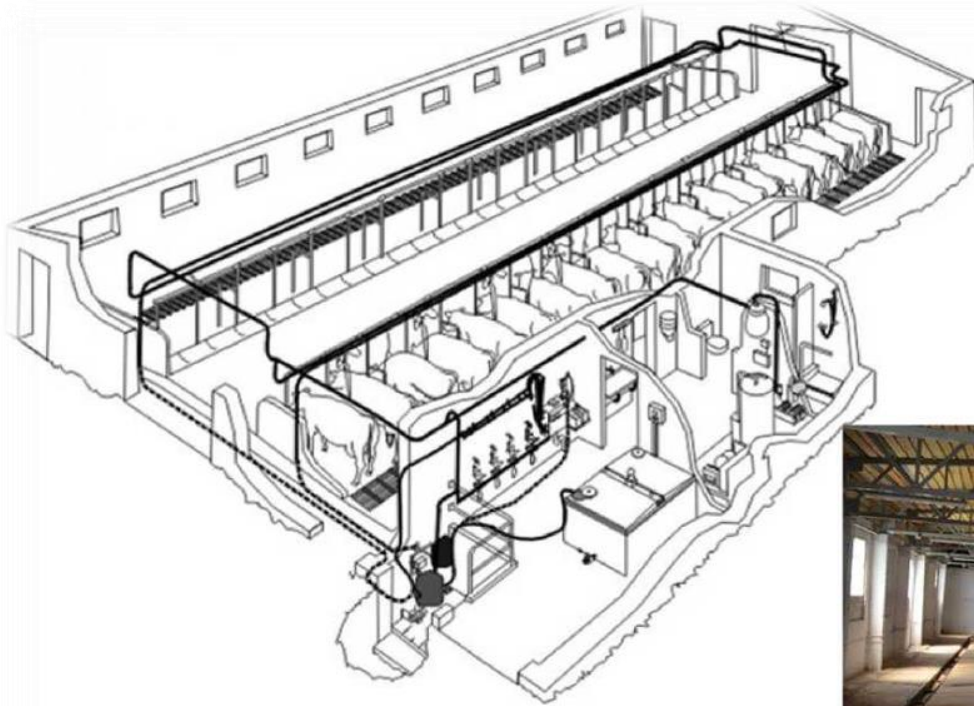
5: vacuum regulator;

6: vacuum unit;

7: vacuum tank;

8: vacuum gauge

Stationary milking machines for pipeline milking



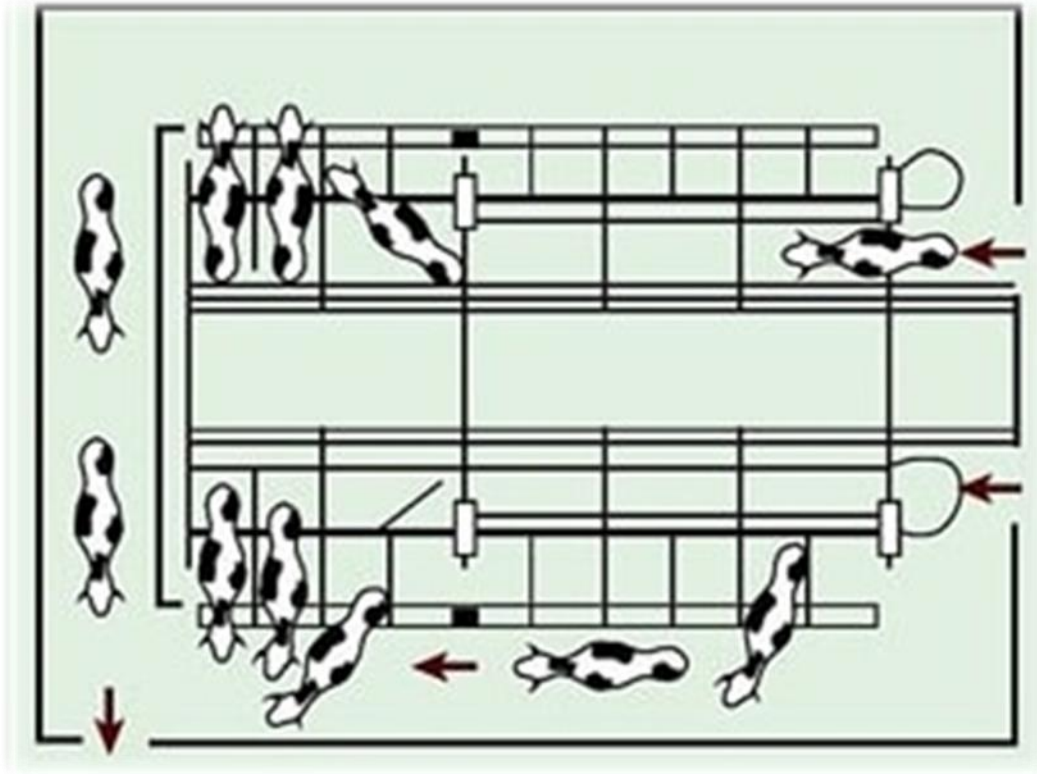
On farms with free-stall housing, cows are milked using Tandem, Herringbone, and Carousel machines.



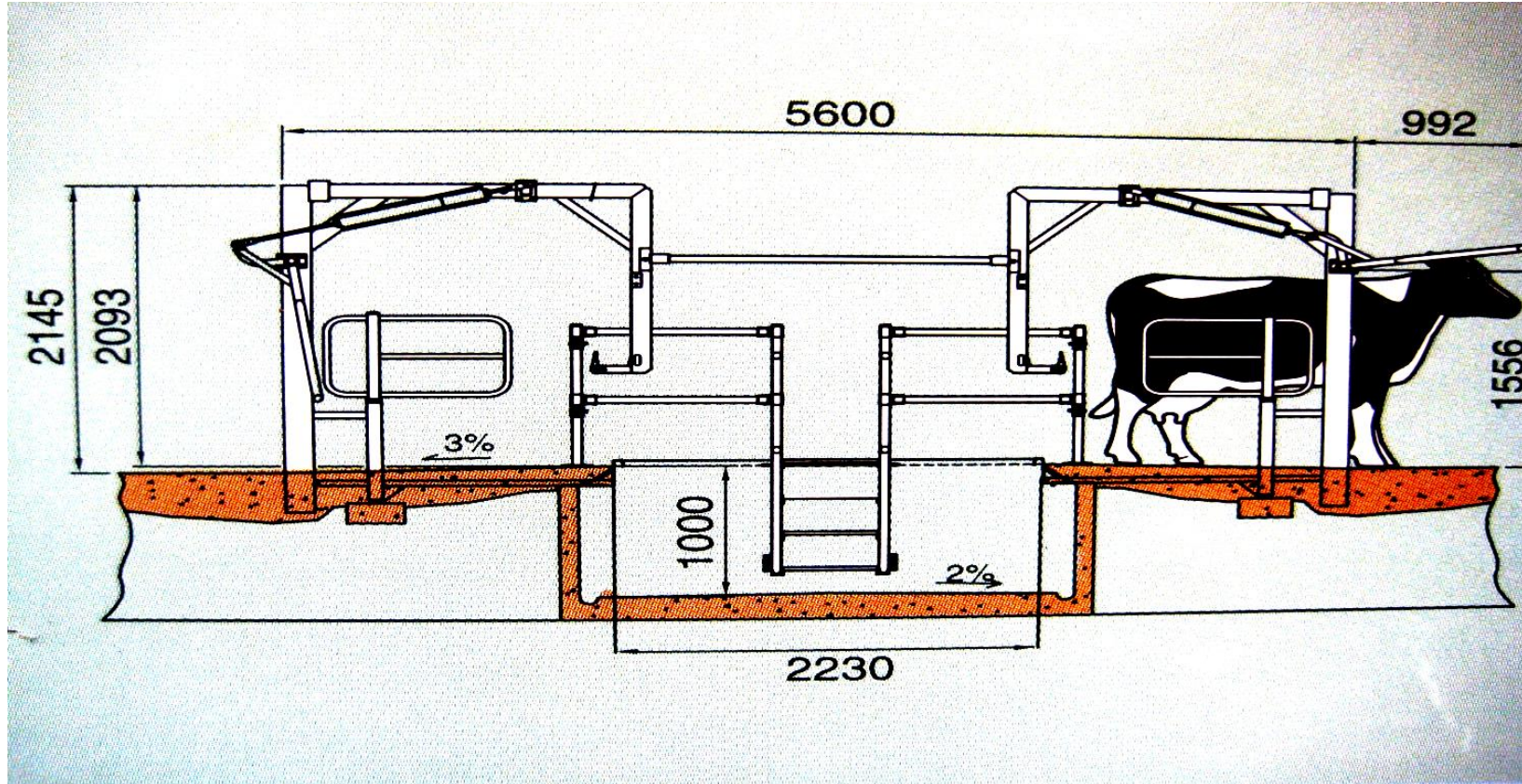
Characteristics of milking machines for milking parlors

| parameter | Tandem UDA-8A | Herringbone UDA-16A | with tandem UDS-3B machines |
|---|---------------|---------------------|-----------------------------|
| number of cows | 200–400 | 400–600 | 100–200 |
| number of milking stalls | 4×2 | 8×2 | 8 |
| number of machines with which the operator works simultaneously | 8 | 16 | 4 |
| number of maintenance personnel, persons | 1 | 1 | 2 |
| operator performance, heads per hour | 60–70 | 60–80 | 25 |
| throughput, heads per hour | 60–70 | 60–80 | 50–55 |

Cows in the Europarallel milking parlor



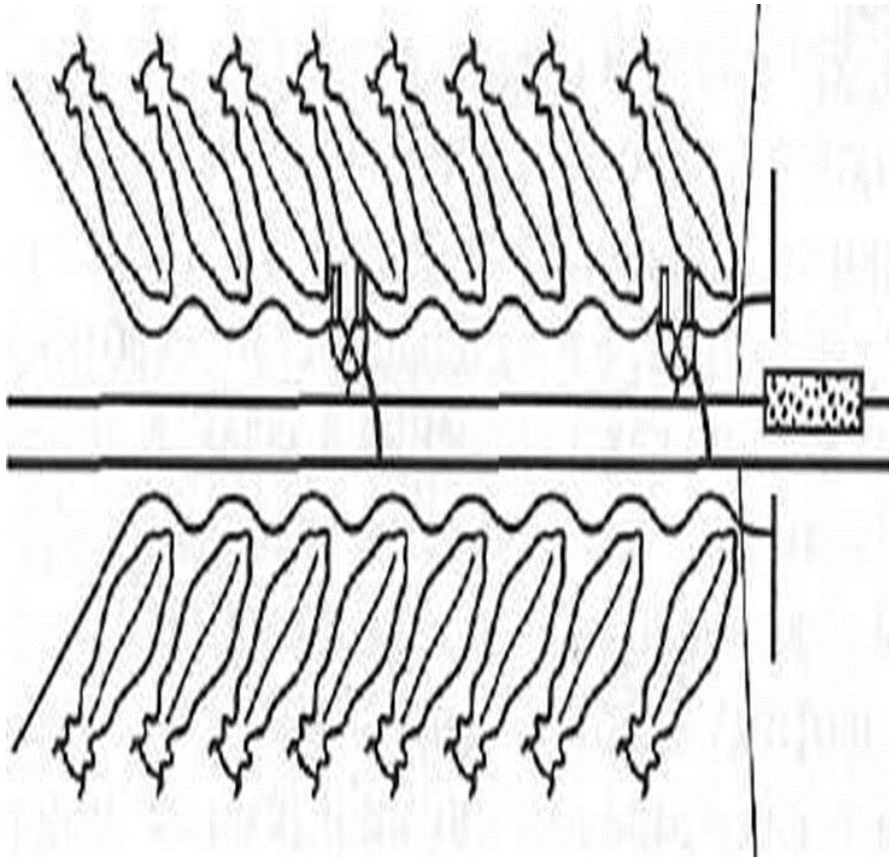
Cross-section of the Parallel milking machine





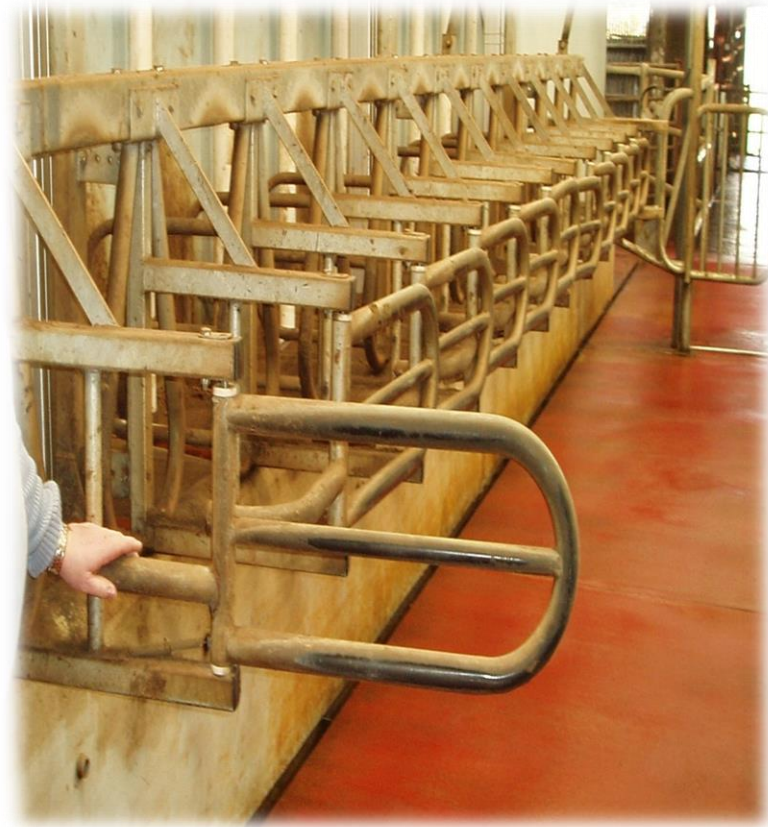
Rapid-exit milking parlor Parallel

Stationary herringbone milking machine





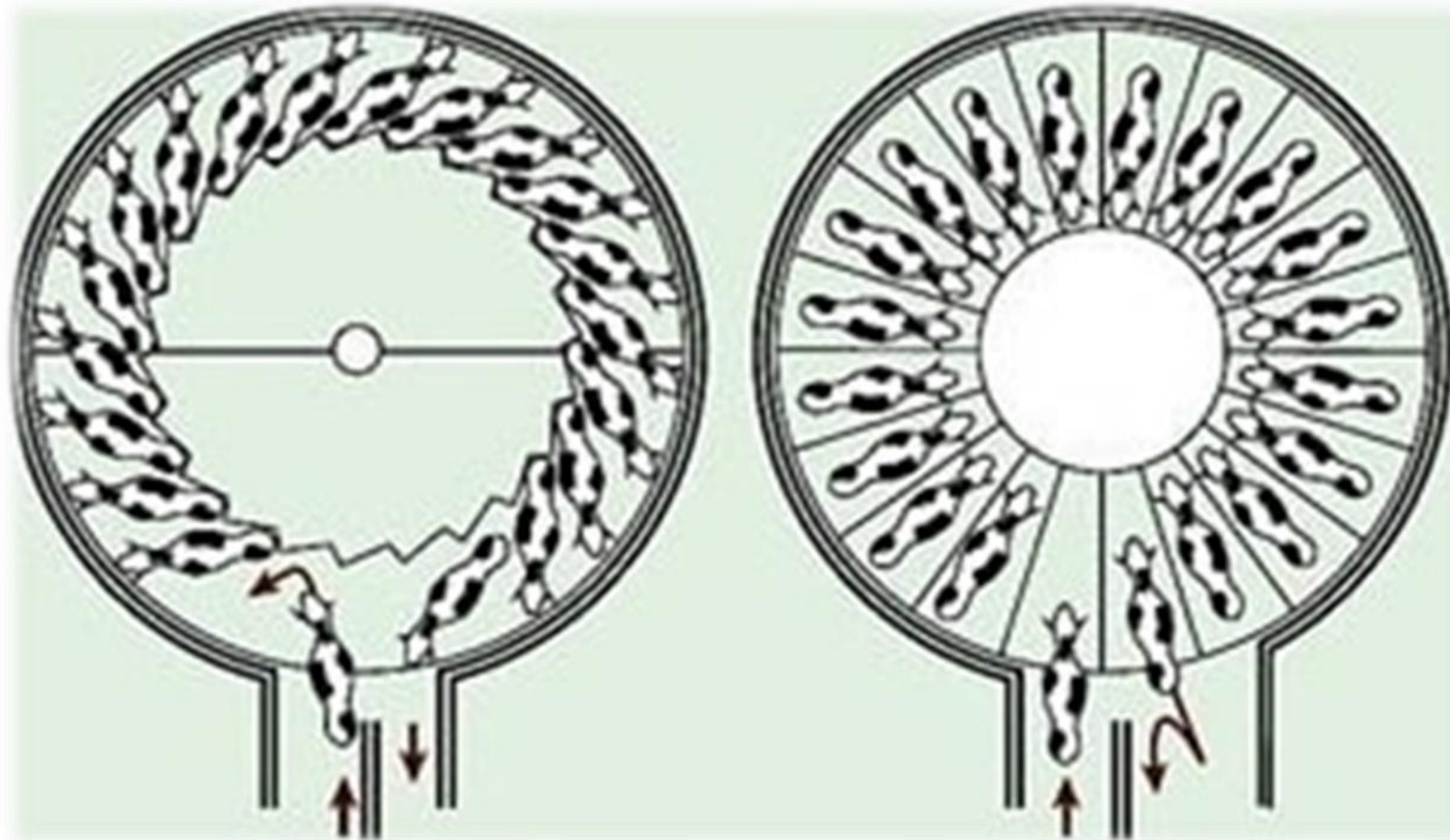
Backing gate



Stall structures: feeding stations



Carousel milking parlors



Carousel milking parlors

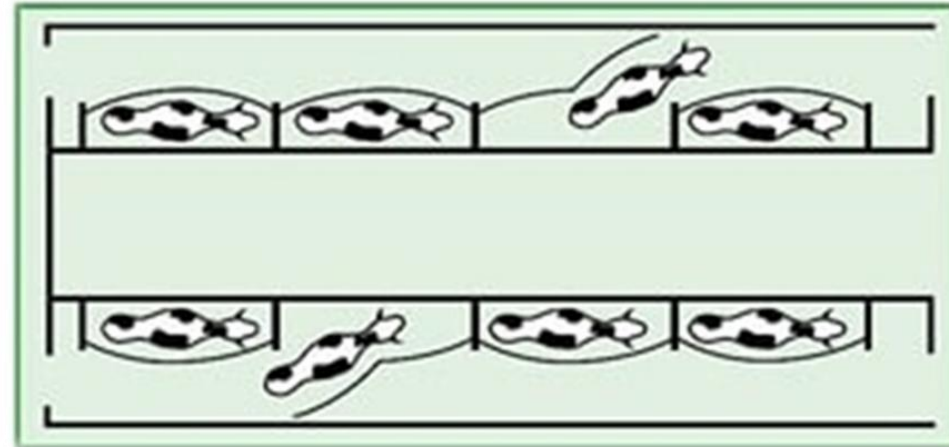


Carousel milking parlors





Tandem milking parlors

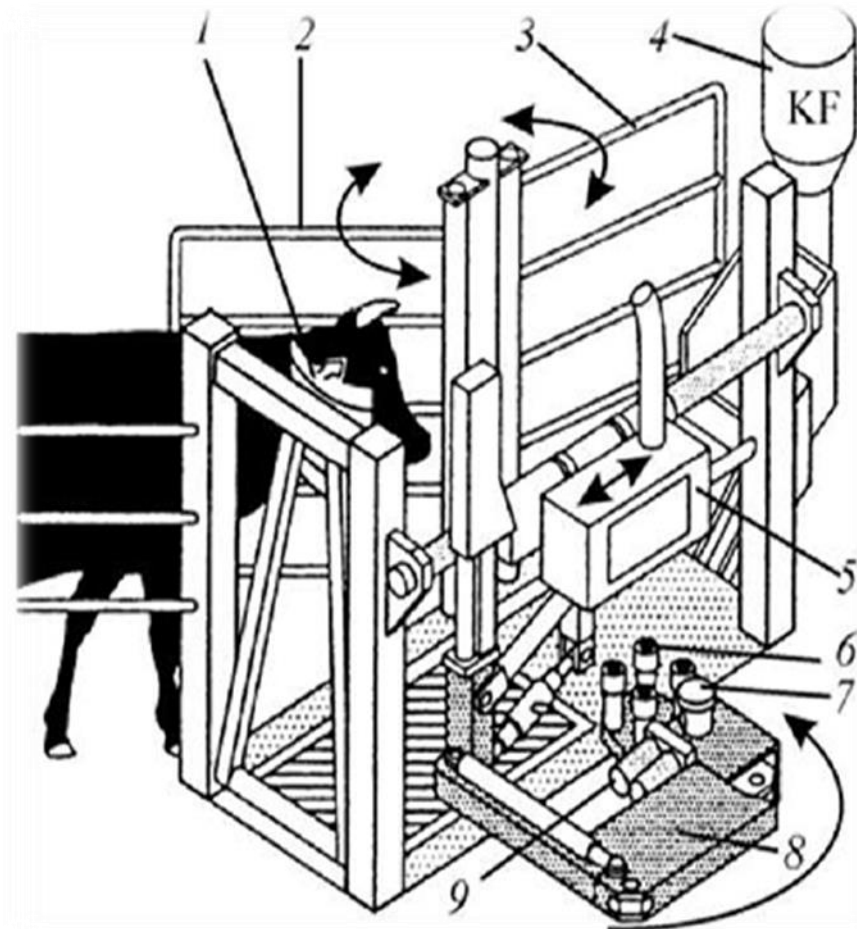


Mobile milking parlors



Robotic milking of cows





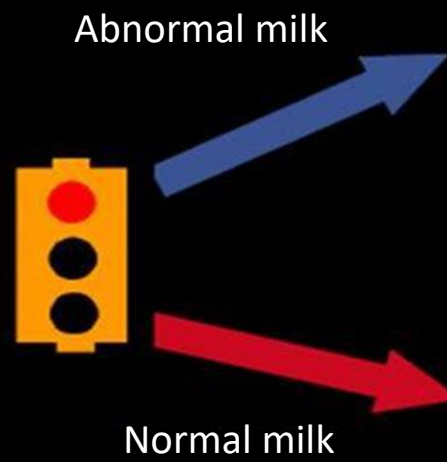
- Astronaut milking robot:
- 1: positioner;
 - 2: entrance door;
 - 3: exit door;
 - 4: automatic feeding station;
 - 5: arm movement control unit;
 - 6: teat cups;
 - 7: laser sensors;
 - 8: robot arm;
 - 9: udder cleaning rollers







Automatic separation







Thank you!