

**RESEARCHES REGARDING BACTERIOLOGIC AND  
MYCOLOGIC POLLUANT LEVEL OF COW MILK, ON  
TECHNOLOGICAL FLOW**

**CERCETĂRI PRIVIND NIVELUL POLUATOR  
BACTERIOLOGIC ȘI MICOLOGIC AL LAPTELUI DE VACĂ,  
PE FLUX TEHNOLOGIC**

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*Summary: Researches done on a B.R. 64 milking cows live stock, regarding microbiological charge of cow milk and pollutant sources on technological flow,. Samples were taken in sterile test tubes, to study the microbial charge level from: milking empty canteen; gauze used for udder hygiene; first milking milk jets from the four quarters; total milking milk on lots; water used for mammary gland hygiene; after the first and after the last milking animal; cooling tank (milking milk on total /live stock). Laboratory analysis regarding microflora charge level of samples, evidence enough large variations regarding microbial charge level in samples collected.*

**Keywords:** cow, milk, qualiti, microbial charge level,

**Materials and Methods**

Investigations regarding microbiologic charge (bacteriologic and mycologic) of cow milk contamination main sources, on technological flow, from collection till delivery, were done in a zootechnic unit, on a 64 dairy cow live stock of BR. breed, in 4 lots, with feeding central alley and faeces mechanical removal. Milking system is to canteen of Banat type, and milking milk is stored into plastic and aluminium material canteens, previously by gauze strained. Milk transport to collection central point it is realised by each farmkeeper handly.

Samples were taken in sterile test tubes, to study the microbial charge level from:

- milking empty canteen,
- gauze used for udder hygiene,
- first milking milk jets from the four quarters,
- total milking milk on lots,
- water used for mammary gland hygiene, after the first and after the last milking animal,
- cooling tank (milking milk on total /live stock).

Microbiologic analysis regarding microbial charge level in milk and water samples collected, pursuit the folowing determinations:

- the total number of germs (NTG), using nutritive agar,
- coliform bacteria, using medium with sodium detoxicolate and lactose,
- streptococcus, using medium for streptococcus colonies determination,
- anaerobics sulphite-reducers using agar with sodium sulphite and iron citrate

- mushrooms (fungus and moulds) using Sabouraud medium.

Laboratory analysis on microflora samples collected, is realized by passing the following stages:

- realizing of tenth dilutions of  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$
- these are used for realizing the insemination in agar, on special mediums
- thermostating during 24 hours, at  $37^{\circ}$  C and counting the formed colonies.

## Results and Discussion

A. Laboratory investigation results regarding microbiological charge of samples collected in milking canteen, before milking act, are presented in table 1.

Table 1

Microflora which is present in milking canteen

Lotul	NTG				Coliformes				Anaerobics	Fungi			
	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-2}$	$10^{-1}$	$10^{-2}$	$10^{-3}$	X
I	1420	237	75	577	304	180	14	166	7	890	91	11	330
II	1032	583	65	560	528	43	12	194	6	654	80	7	247
III	2015	1045	98	1056	602	154	29	261	10	305	28	5	112
IV	1545	789	66	800	640	206	25	290	8	906	89	11	135

Values obtained and presented in table 1 put in evidence the following aspects:

- the total number of germs (NTG), aerobic mesophilic, presents differences to the four lots, existing minimal values in lot II ( $560 \times 10^{-2}$  germs), maximal in lot III ( $1056 \times 10^{-2}$  germs),
- coliformes bacteria number have minimal values in lot I ( $166 \times 10^{-2}$ ) and maximal in lot IV ( $290 \times 10^{-2}$ )
- anaerobic sulphite-reducers, although they are present in low number, yet present a maximal level in lot III ( $10 \times 10^{-2}$ ) and minimal in lot II ( $6 \times 10^{-2}$ )
- contamination with fungi presents maximal values in lot I ( $330 \times 10^{-2}$ ) and maximal values in lot III ( $112 \times 10^{-2}$ )

B. In table 2. are presented the values of main microbiologic parameters in samples collected from gauze used to mammary gland hygiene.

Table 2

Microflora which is present in samples collected from gauze used to udder hygiene

Lot	NTG				Coliformes				Anaerobics	Fungi			
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-2</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X
I	424	85	13	174	214	16	3	77	1	470	52	8	176
II	728	80	15	332	304	24	3	111	0	903	82	11	332
III	1452	488	53	664	1098	145	16	419	3	721	89	6	272
IV	1562	520	43	708	298	23	4	108	5	1172	272	30	490

Data obtained and presented in table 2 put in evidence enough large variations regarding microbial charge level in samples collected from textiles used to mammary gland hygiene. Thus,

- total number of germs (NTG) presents minimal values in lot I ( $17 \times 10^2$  germs) and maximal in lot IV ( $708 \times 10^2$  germs)

- presence of coliformes bacteria, determined on medium with sodium deoxycolate and lactose is relatively reduced, minimal in lot I ( $77 \times 10^2$  germs) and maximal in lot IV ( $419 \times 10^2$  germs)

- anaerobic sulphyte reductors identified, present low values, absent in lot II and maximal level in lot III ( $5 \times 10^2$  germs)

- fungi (yeasts and moulds) are present, and their number is minimal in lot I ( $176 \times 10^2$  germs) and maximal in lot IV ( $490 \times 10^2$  germs).

C. Laboratory analysis regarding microflora charge level of milk samples (first jets) put in evidence the following aspects, shown in table 3:

Table 3

Microflora which is present in milk samples collected (first jets)

Lotul	NTG				Coliformes				Anaerobics	Streptococi				Fungi
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-2</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-2</sup>
I	50	6	1	19	19	2	0	7	0	904	95	8	335	1
II	166	18	2	62	233	37	1	90	0	736	69	6	270	1
III	154	17	2	57	219	37	2	86	2	960	83	11	351	2
IV	140	13	2	52	206	35	1	80	2	616	58	7	227	1

Microflora which is present in the sample of first milk jets (table 3) puts in evidence quantitative variations correlated with animal lot, as follows:

- total number of germs (NTG) presents minimal values in lot I ( $19 \times 10^2$  germs/ml) and maximal in lot II ( $62 \times 10^2$  germs/ml)

- coliforme bacteria are surrounded between minimal limits in lot I ( $7 \times 10^2$  germs/ml) and maximal in lot II ( $90 \times 10^2$  germs/ml)

- anaerobic sulphyte reductors are present only in lots III and IV, their values being low /  $2 \times 10^{-2}$  germs/ ml milk.

- in milk samples is followed also the streptococcus presence which shows minimal values in lot IV milk sample ( $227 \times 10^{-2}$  germs/ml) and maximal in lot III ( $351 \times 10^{-2}$  germs/ml milk)

- fungi are present in low number , by  $1 \times 10^{-2}$  germs in lots I, II and IV, and  $2 \times 10^{-2}$  germs in lot III.

D. Microflora from total milking milk samples on cow lots, shows the following values, presented in table 4.

Table 4

Microflora which is present in total milking milk on cow lots

Lotul	NTG				Coliformes				Anaerobics	Streptococi				Fungi
	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-2}$	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-2}$
I	105	9	3	39	92	11	3	35	4	1160	106	11	426	1
II	37	4	1	14	57	5	2	21	0	760	68	7	278	0
III	70	8	2	27	62	7	1	23	0	544	55	6	302	6
IV	60	7	2	23	58	5	2	22	1	600	59	7	222	2

Obtained and presented data regarding microbiologic charge level in collected samples in total milking milk on lots put in evidence the followings:

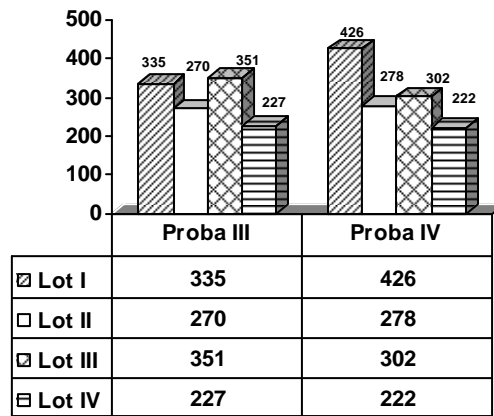
- total number of mesophyle aerobic germs presents minimal values in lot II ( $14 \times 10^{-2}$  germs/ml) and maximal in lot I ( $39 \times 10^{-2}$  germs/ml)

- coliforme bacteria have a charge with nearly minimal values in lots II, III and IV (21, 23, 23  $\times 10^{-2}$  germs/ml) and maximal in lot I ( $35 \times 10^{-2}$  germs/ml)

- presence of anaerobics was put in evidence in lots I ( $4 \times 10^{-2}$  germs) and IV ( $1 \times 10^{-2}$  germs), being absents in the other lots

- presence of streptococcus in total milking milk samples collected on lots put in evidence a charge of these with minimal values in lot IV ( $222 \times 10^{-2}$  germs/ml) and maximal in lot I ( $426 \times 10^{-2}$  germs/ml)

The streptococcus presence in milking milk samples of first jets and in total milking milk on cow lots puts in evidence a high level of these, as a consequence of milk contamination with faeces streptococcus in milking process (picture 1)



Picture 1. Variation of streptococcus number in milk samples (first jets and total milking)

- fungi are present in total milking milk samples, in a low number in lot I ( $1 \times 10^{-2}$  germs), IV ( $2 \times 10^{-2}$  germs) and III ( $6 \times 10^{-2}$  germs) and absent in lot II.

E. Results regarding microbiologic analysis of water after first utilization, in first animal, are shown in table 5.

Table 5

Microflora which is present in water samples used for mammary gland hygiene (hygiene of first animal)

Lotul	NTG				Coliformes	Anaerobics	Fungi			
	$10^{-1}$	$10^{-2}$	$10^{-3}$	X	$10^{-2}$	$10^{-2}$	$10^{-1}$	$10^{-2}$	$10^{-3}$	X
I	978	106	12	365	0	0	356	44	5	135
II	613	54	5	224	54	0	32	2	0	11
III	854	89	9	321	15	2	25	2	0	9
IV	687	77	8	257	0	1	213	32	4	83

Data obtained and presented in table 5, reveal the following values:

- total number of germs shows a minimal charge in lot II ( $224 \times 10^{-2}$  germs) and maximal in lot I ( $365 \times 10^{-2}$  germs)
- coliforme bacteria are absent in samples of lots II and IV, but present in lots III ( $15 \times 10^{-2}$  germs) and II ( $54 \times 10^{-2}$  germs)
- anaerobic sulphite reductors bacteria are absent in samples I and II and minimal in samples III ( $2 \times 10^{-2}$  germs) and IV ( $1 \times 10^{-2}$  germs)
- fungi presents large limit variations in the 4 lots, with minimal values in lot III ( $9 \times 10^{-2}$  germs) and maximal in lot I ( $135 \times 10^{-2}$  germs).

F. Microflora value present in water samples taken from the water which is used to make mammary gland hygiene, last utilization, is shown in table 6.

Table 6

Microflora which is present in water samples used tomamary gland  
hygiene (hygiene of last cow)

Lotul	NTG				Coliformes	Anaerobics	Fungi			
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X	10 <sup>-2</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	X
I	1865	296	22	728	3	2	692	78	6	259
II	1452	156	16	541	9	3	283	25	5	104
II	1913	186	25	741	325	16	231	21	3	85
IV	1245	186	17	483	29	4	677	64	7	246

From data presented in table 6 there are put in evidence the following aspects:

- total number of germs (NTG) shows values with minimal limits in lot IV (483 x 10<sup>-2</sup> germs/ml) and maximal in lot III (741 x 10<sup>-2</sup> germs/ml)
- coliforme bacteria present minimal values in lot I (3 x 10<sup>-2</sup> germs) and maximal in lot III (325 x 10<sup>-2</sup> germs)
- anaerobics sulphyte reductors present the same variations, with minimal limits in lots I, II and IV (2, 3, 4 x 10<sup>-2</sup> germs) and maximal in lot III (16 x 10<sup>-2</sup> germs)
- fungi are present in a low number in lot III (85 x 10<sup>-2</sup> germs) and high in lot I (259 x 10<sup>-2</sup> germs).

G. Microbiologic charge values of total milking milk in farm, in average sample collected from cooling tank, are presented in table 7.

Table 7

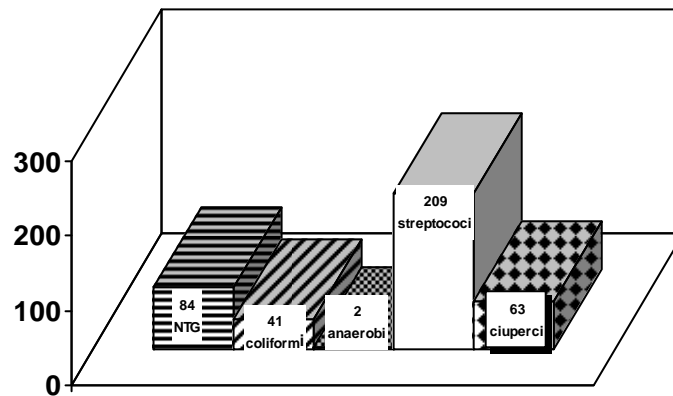
Microflora which is present in average milk sample, taken from cooling  
tank (total milking milk/ live stock)

Genus	Dilution	Results
NTG	10 <sup>-1</sup>	149
	10 <sup>-2</sup>	95
	10 <sup>-3</sup>	8
	X (10 <sup>-2</sup> )	84
	10 <sup>-1</sup>	73
COLIFORMES	10 <sup>-1</sup>	45
	10 <sup>-2</sup>	5
	10 <sup>-3</sup>	41
	X (10 <sup>-2</sup> )	5
	10 <sup>-1</sup>	1
ANAEROBICS	10 <sup>-1</sup>	0
	10 <sup>-2</sup>	2
	10 <sup>-3</sup>	563
	X (10 <sup>-2</sup> )	56
	10 <sup>-1</sup>	9
STREPTOCOCCI	10 <sup>-1</sup>	209
	10 <sup>-2</sup>	117
	10 <sup>-3</sup>	65
	X (10 <sup>-2</sup> )	7
	10 <sup>-1</sup>	63
FUNGI	10 <sup>-1</sup>	63
	10 <sup>-2</sup>	
	10 <sup>-3</sup>	
	X (10 <sup>-2</sup> )	
	10 <sup>-1</sup>	

Data presented in table 7 put in evidence the following aspects:

- total number of aerobic mesophyle germs (NTG) shows values of 84 x 10<sup>-2</sup> germs/ml milk sample. The other categories of bacteria taken in study are found in the following proportions: 41 x 10<sup>-2</sup> coliforme

germs/ ml;  $2 \times 10^{-2}$  anaerobic germs/ml and  $209 \times 10^{-2}$  streptococcus/ml. In turn, fungi present values of  $63 \times 10^{-2}$  germs/ml.



Picture 2. Variation of microbiologic charge in total milk

### Conclusions

Researches done on a B.R. 64 milking cows live stock, regarding microbiological charge of cow milk and pollutant sources on technological flow, reveal the following aspects:

- total number of germs presents notable variations, with maximal values in sample I (empty canteen), lot III ( $1056 \times 10^{-2}$  germs) and minimal in sample IV (milk/ lot), lot II ( $14 \times 10^{-2}$  germs).

Probably for samples strong polluted (high NTG), sources of contamination are represented by microbial flora in shelter:

- coliforme bacteria vary in large limits, function of analyzed samples, with maximal level in sample II (udder hygiene gauze), lot III ( $419 \times 10^{-2}$  germs) and minimal in sample III (milk of first jets), lot II and IV ( $1 \times 10^{-2}$  germs)

- number of streptococcus, determined in milk samples, put in evidence maximal values in sample IV (total milking milk/ lots), lot I ( $426 \times 10^{-2}$  germs/ml) and minimal in sample IV (total milk/lot), lot IV ( $222 \times 10^{-2}$  germs). Main source of contamination in milking milk is represented by streptococcus coli

- anaerobic sulphyte reductors bacteria, although present in most analyzed samples, present a maximal level in sample I (empty canteen), lot III ( $10 \times 10^{-2}$  germs) and a minimal in sample IV (total milk/ lots), lot IV ( $1 \times 10^{-2}$  germs). The presence of these bacteria indicates contamination with spores in milking receptacles and textiles used for udder hygiene, these being also the sources of milk contamination.

- number of fungi, present in analyzed samples, varies in large limits, charge of mycetic flora being present in maximal level in sample II (gauze used for

hygiene), lot III ( $490 \times 10^{-2}$  germs) and minimal in samples III (first jets of milking milk), lots I, II and IV ( $1 \times 10^{-2}$  germs).

- Total milk sample analyzed, collected from collection and cooling tank, puts in evidence a microbiological charge in normal limits, thus NTG is of  $84 \times 10^{-2}$  germs, being observed the domination of streptococcus,  $209 \times 10^{-2}$  germs/ml. Fungi show a high level,  $63 \times 10^{-2}$  germs/ml, and coliformes,  $41 \times 10^{-2}$  germs/ml. A low level, have the anaerobics, of  $2 \times 10^{-2}$  germs/ml.

- milk contaminant flora is of faeces origin (coliformes and streptococcus) and is realized during technological flow.

### References

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