

## **MILK PRODUCTION IN RECORDED COWS IN THE LAST TEN YEARS IN CROATIA**

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### **ABSTRACT**

The results of milk recording in Croatia were studied for the period of ten years. In the past years, the number of cows under selection control has been significantly increased. In 1994 this percentage was 19.5%, while in 2003 it increased up to 62.5%, when compared to the total number of cows. Unlike farming enterprises, the number of cattle producers and herd size on family farms has been increased. The number of milk recorded cows has been increasing as well. In 2003 there were 20.9% milk recorded cows, ten years ago only 8.9%. In Croatia, the most used breed is Simmental (67.2%), followed by Holstein (31.8%), and Brown breed (0.95%). The growing interest of the producers on family farms in Holstein breed is evident. The milk production of Simmental, Holstein and Brown breeds is presented separately for the family farms and for the enterprises. The increased average of milk yield, fat and protein percentage during 305 days of lactation is evident in all 3 breeds, particularly since 2001. Ranging in milk production traits in recorded cows during the monitoring period, as well as quite significant positive trends in recent years are reflecting the breeding conditions in Croatia.

Key words: cattle / dairy cows / milk production / recording / Croatia

## **PRIREJA MLEKA PRI KRAVAH V KONTROLI V ZADNJIH DESETIH LET NA HRVAŠKEM**

### **IZVLEČEK**

V študiji so obdelani rezultati kontrole prireje mleka za obdobje desetih let na Hrvaškem. Število krav, vključenih v rejski program, je v zadnjih letih močno poraslo. Gleda na skupno število krav je bilo leta 1994 v rejski program vključenih 19,5% krav, med tem ko je njihov delež v letu 2003 narasel na 62,5%. V nasprotju z govedorejskimi obrati se je število družinskih kmetij in velikost čred povečalo. Prav tako je naraslo število krav v kontroli prireje mleka. V letu 2003 je bilo v kontroli 20,9% krav, pred devetimi leti le 8,9%. Na Hrvaškem prevladuje reja krav lisaste pasme (67,2%), nato krave holštajnske pasme (31,8%) in krave rjave pasme (0,95%). Na družinskih kmetijah se bolj zanimajo za povečevanje reje krav holštajnske pasme. Prireja mleka po pasmah (lisasta, holštajnska in rjava) je predstavljena ločeno za družinske kmetije in govedorejske obrate. Pri vseh treh pasmah je zaznati občutno povečanje mlečnosti ter odstotkov maščobe in beljakovin v standardni laktaciji (305 dni), še zlasti od leta 2001 dalje. Povečana prireja mleka pri kravah v kontroli za opazovano obdobje, pa tudi pozitivni trendi zadnjih let, kažejo pogoje reje na Hrvaškem.

Ključne besede: govedo / krave / molznice / mleko / prireja / kontrola / Hrvaška

## INTRODUCTION

There is a long tradition of breeding and selection of cattle in Republic of Croatia; the beginnings of organised work started in 1913, when Union of cattle breeding associations was established in Sv. Ivan Žabno. More intensive influence of selection started after launching the national breeding program (1974), and modern new breeding program (1992). The main breeding goal is the creation of genetic base population of cattle by selection of sires and dams of the best quality with the aim of gaining maximum profit through the increase of production potential. The genetic construction is based mainly on the breeding of own sires and occasional import of the semen from proven quality bulls originating from different population. In such manner, program is open for import of genes from the populations worldwide.

Significant social and economic changes which influenced entire agricultural production (transition, privatisation, war damages, loss of the market) took place after Croatia gained its independence. In line with the new laws on agriculture, agricultural lands, environmental production and the law on subsidies the following goals were set up: the increase of domestic animals fund, the increase of family farm size, modernisation of production capacities and improving the animal products quality. The process involved cattle production, especially dairy production, resulting in subsidies, the improvement of selection activities and the support of the advisory service. The changes in size and structure of controlled population, as well as in the milk production level presented in this paper, are the consequence of the above mentioned changes and of the breeding and selection work in the past ten years.

## MATERIAL

The data used in this paper are obtained from the Annual reports of Croatian Livestock center from 1994 to 2003 (Godišnje izvješće. Hrvatski stočarski centar, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003). The data served as a basis for analysing the size and structure of the dairy cow population under selection, with special emphasis on milk production in milk recorded cows. Selection is defined as milk and parentage recording or only parentage controlling. All lactations are 305 days lactations, milk production is presented as an average value of all lactations.

The milk recording was performed according to ICAR guidelines. Alternate (AT) and A4 methods were used on family farms and enterprises respectively. Since 2002 the fat and protein content have been determined in the Central laboratory for milk control in Križevci, which acts in accordance with the application of the new milk control system.

## RESULTS

### Size and structure of the controlled population

The milk production is done mainly on the family farms and on the smaller scale in the enterprises. Table 1 clearly shows the variation in the total number of cows during the monitored period, but with the decreasing trend regarding the total number in 1994. On the other hand, the proportion of the cows under selection is increasing on a yearly basis.

In 1994 this percentage was 19.55%, while in 2003 this value was 62.49%. The increase refers to family farms, followed by the increase of the number of breeders (Table 2).

Table 2 shows slight increase of the average number of cows per farm. On the contrary, there is no tendency towards higher average number of cows on the enterprises. The distribution of the herd regarding the size clearly shows the increase of the number of breeders with higher number

of cows, i.e. the number of breeders having 1–3 cows in the herd is tending to decrease (Table 3). Similar trend is reported by Klopčič *et al.* (1998) in Slovenia.

Table 1. Review of total number of cows and cows under selection control

Year	Total number of cows	Cows under selection control			
		Family farms	Enterprises	Total	In relation to total number of cows, %
1994	226 231	39 051	5 178	44 229	19.55
1995	235 400	42 689	4 455	47 144	20.03
1996	233 477	48 247	4 132	52 379	22.43
1997	233 207	62 205	3 602	65 807	28.21
1998	230 650	75 921	6 224	82 145	35.61
1999	228 014	80 198	6 218	86 416	37.90
2000	214 666	85 459	7 439	92 898	39.81
2001	219 782	91 235	7 606	98 841	44.97
2002	224 078	101 157	7 367	108 524	48.43
2003	223 954	133 064	6 895	139 959	62.49

Table 2. Number of breeders and cows under selection control

Year	Family farms			Enterprises		
	No. of cattle breeders	No. of cows	Average number of cows per herd	No. of enterprises	No. of cows	Average No. of cows per enterprises
1994	12 019	39 051	3.2	16	5 178	323.6
1995	13 274	42 689	3.2	14	4 455	318.2
1996	15 534	48 247	3.1	13	4 132	317.8
1997	19 160	62 205	3.2	12	3 602	300.2
1998	22 705	75 921	3.3	21	6 224	296.2
1999	22 714	80 198	3.5	26	6 218	239.2
2000	22 482	85 459	3.8	26	7 439	286.1
2001	23 154	91 235	3.9	23	7 606	330.7
2002	23 743	101 157	4.3	27	7 367	272.9
2003	26 651	133 064	5.0	21	6 895	328.3

Table 3. Number of breeders according to herd size

Year	Herd size								Total	
	1–3		4–9		10–15		>15			
	No.	%	No.	%	No.	%	No.	%	No.	%
1999	14 106	61.91	7 603	33.37	828	3.63	247	1.08	22 784	100
2000	13 602	60.29	7 781	34.39	887	3.93	292	1.29	22 562	100
2001	13 321	57.33	8 475	36.48	1 124	4.84	314	1.35	23 234	100
2002	12 888	54.06	9 252	38.31	1 278	5.36	421	1.77	23 839	100
2003	11 293	42.21	13 166	49.21	1 690	6.32	604	2.26	26 753	100

### The size and structure of the cow population in milk recording

Milk recording is the most important part in the breeding program employment, because the success of selection depends on the percentage of milk recorded cows. In the past 10 years the number of milk recorded cows is increasing (Table 4).

Table 4. Review of number and breed structure of milk recorded cows

Year	Cows in milk recording					
	Size			Breed structure		
	No. of cows	According to total No. of cows, %	According to No. of cows under selection control, %	Simmental breed, %	Holstein breed, %	Brown breed, %
1994	20 261	8.95	45.81	70.98	28.35	0.67
1995	23 573	10.01	50.00	74.39	25.11	0.40
1996	29 727	12.73	56.75	75.90	23.58	0.52
1997	40 280	17.27	61.21	79.36	20.08	0.56
1998	48 219	20.90	58.70	73.78	25.30	0.92
1999	42 650	18.70	49.35	71.46	27.61	0.93
2000	42 634	19.86	45.89	68.03	30.99	0.98
2001	42 092	19.15	42.85	67.51	31.67	0.82
2002	43 360	19.35	39.95	66.33	23.78	0.88
2003	46 754	20.88	33.41	67.22	31.83	0.95

In comparison to 1994 this number redoubled. Significant changes are observed in respect to the percentage of cows under the selection control. The number of milk recorded cows increased in the period 1994–1997, while in the period 1998–2003 this number decreased, due to the fact that the most of new breeders chose only the reproduction control, being the ones with small herds. Nevertheless, in the next period of time the increase in number of cows under control is expected, due to the increasing interest of breeders for this type of recording of their herds.

The breeding structure in milk recorded cows points out the superiority of Simmental breed in comparison to Holstein and Brown breed (Table 4). Since 1998 the number of Holstein breeders is increasing, which is in accordance with the increased number of herd size and with the economic interest of breeders whose family farms have been specialised.

Table 5. Average herd size in milk recorded cows

Year	Family farms		Enterprises	
	Simmental	Holstein	Brown	Holstein
1999	5.4	9.2	4.7	-
2000	6.0	11.2	6.6	346.4
2001	6.1	11.1	6.4	390.1
2002	6.4	14.1	8.8	353.9
2003	7.1	14.9	10.1	334.3

The increased number of milk recorded cows, including Holstein breed milk production, is influenced also by the import of larger number of highly gravid heifers on two state farms

(«Belje» and IPK Osijek). Concerning the achieved level of Holstein breed milk production, there is no doubt that the criteria set up for the selection of bull's mothers will be met.

The increasing trend in percentage of Brown breed under control is evident. The increasing of the average herd size in milk production control is evident in all three breeds bred on family farms (Table 5).

### Production traits of milk recorded cows

Totally 4 618 kg milk was produced by Simmental breed on family farms in 2003, showing the increasing trend of 21.5%, when compared to 1995 (Table 6). A very similar positive trend refers to the fat content as well. At the enterprises there is an insignificant number of cows of this breed, but the production is always higher than of those on family farms.

Table 6. Simmental breed: average milk production of milk recorded cows

Year	Family farms				Enterprises			
	Production in 305 days				Production in 305 days			
	No. of lactation	Milk, kg	Fat, %	Protein, %	No. of lactation	Milk, kg	Fat, %	Protein, %
1994	5 232	3 803	3.73	-	87	4 767	3.65	-
1995	5 673	3 800	3.73	-	96	4 348	3.65	-
1996	10 717	3 723	3.82	-	235	4 471	3.75	-
1997	15 127	3 729	3.82	-	235	4 504	3.73	-
1998	19 694	3 963	3.85	3.25	219	4 270	3.71	-
1999	25 914	4 108	3.93	3.27	167	4 364	3.61	-
2000	22 250	4 018	3.89	3.36	193	4 208	3.68	-
2001	21 426	4 173	3.92	3.36	119	4 529	3.63	3.24
2002	21 318	4 423	4.02	3.40	143	4 836	3.75	3.33
2003	19 644	4 618	4.01	3.35	62	5 251	3.82	3.33

Table 7. Holstein breed: average milk production of milk recorded cows

Year	Family farms				Enterprises			
	Milk production in 305 days				Milk production in 305 days			
	No. of lactation	Milk, kg	Fat, %	Protein, %	No. of lactation	Milk, kg	Fat, %	Protein, %
1994	390	4 567	3.61	-	3 192	5 820	3.43	-
1995	358	4 867	3.61	-	2 674	5 952	3.41	-
1996	744	4 821	3.60	-	3 215	5 798	3.50	-
1997	1 013	4 982	3.62	-	3 287	5 765	3.57	-
1998	2 780	5 381	3.74	3.17	2 619	6 008	3.50	-
1999	4 168	5 463	3.84	3.20	3 002	6 112	3.52	3.20
2000	4 234	5 442	3.83	3.28	2 562	6 019	3.56	3.28
2001	4 913	5 660	3.87	3.87	3 328	6 506	3.58	3.22
2002	5 253	5 864	3.98	3.32	4 090	6 818	3.52	3.27
2003	5 279	6 027	4.04	3.25	2 221	7 018	3.61	3.25

It is obvious that the average milk yield in Holstein population produced on the family farms is inferior in comparison to those on enterprises (Table 7). On a yearly basis this difference is

mainly around 1 000 kg, due to better genetic potential of Holstein breed from enterprises on which existing management enables better utilisation of this potential. Genetic potential of Holstein cows from the farms in Eastern Slavonia, with the largest number of specialised dairy farms was at quite high level even before 1991, with an average of 7 000 kg in 2002, and it is close to be reached in 2003.

Table 7 shows that average milk yield and fat percentage is constantly increasing, on family farms and enterprises. But, this is not the case with protein percentage, which is up to 0.10% lower when compared to Simmental breed.

Table 8. Brown breed: average milk production of milk recorded cows on family farms

Year	Milk production in 305 days			
	No. of lactation	Milk, kg	Fat, %	Protein, %
1999	68	4 230	3.99	3.17
2000	223	4 127	3.95	3.33
2001	208	5 311	4.05	3.37
2002	91	5 165	4.12	3.40
2003	104	5 538	4.01	3.38

The interest in Brown breed is increasing due to its average milk yield of above 5 000 kg and high percentage of milk fat and protein (Table 8).

## CONCLUSION

Taking into consideration the review of production characteristics of milk recorded cows in the last ten years, the following conclusions can be drawn:

- the increase of the percentage of cows under selection
- the increase of the number of family farms with increasing number of cows in the herd
- the tendency of increasing number of breeders with specialised type of farm, in which better profit is ensured
- the increase of milk production in recorded cows on family farms and enterprises for all three breeds

The presented average milk productivity of milk recorded cows reflects the present situation in Croatia, where positive trends are evident, being in line with the achievement of goals mentioned in the introduction. They refer to the increasing number of breeding stock, the improvement of selection work, to the support by advisory services and subsidies to the breeders.

The achieved productivity was also influenced by the import of highly gravid Simmental and Holstein breed from the countries with developed cattle breeding and high level of milk production. The production results are also reflection of important positive steps in milk control and of the introduction of new methods for estimation of breeding values. In future, the task refers to further improvement of the genetic base for milk production. One of quite important steps in that sense is the increasing of proportion of cows under production control.

The results of such control give producers the opportunity of better and more efficient breeding, as well as of the management improvement.

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