

CONDITION AND PRODUCTION CHARACTERISTICS OF CATTLE BREEDING IN THE AREA OF THE BASIN OF RIVER BREGALNICA

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Abstract

In the Republic of Macedonia pastures take 50.8% from the total agricultural area. Feeding of cattle with grazing allows the cheapest production of meat and milk (Azderski & Jakimovski, 1996). Considering climate factors and conditions in the country, it is provided up to 6-7 months when the cattle is at pastures, starting from April to the end of October. The remaining period of the year cattle is feed with a partial supplement of the grazing, and in the winter period with conserved feed (silage, haulage and hay). Fifty year ago, the cattle in the country was universally used for labour in the agriculture and forestry, as well as for production of meat and milk. Busha was the largest and most common breed of cattle (Azderski, 2003, 1996). Today, the breed composition of the cattle breeding in the country is changed, so it is difficult to meet Busha in pure blood. General characteristics of the cattle breeding are:

- Low milk yield per cow 2,152 litres;
- Very early slaughter of the offspring, in average 124kg live weight;
- Small land property per household 1-3ha;
- Small size of the area under forage in terms of ploughed field, which is 7%, compared to the developed countries where that percentage is 34-40%;
- Small percentage of cows covered with artificial insemination and parent bookkeeping, approximately 6-8% of the population, while before the transition period this percentage was more than 20%;
- Big import of precious breeds, in the first place Holstein-Friesian breed, but after a short time period these breeds are quickly pulled out from production;
- Low information and knowledge on the production technology for highly productive cattle;
- Challenges in production of high quality voluminous feed;
- Insufficient measures built by the country for supporting the farmers; and
- Spending large financial assets to import livestock products and insemination material.

The tendency in the world and in the country is to lower the number of farmers, to increase the number of cows per farm, and at the same time to increase the production per livestock head and to specialize the production in order to satisfy the needs of the population for meat and milk. Considering the economic importance of their products (meat, milk and manure), cattle comes to the first place in the livestock breeding in the Republic of Macedonia.

Key words: number of cattle, production characteristics of cattle breeding, area of the basin of river.

Introduction

Cattle breeding is one of the main livestock branches that ensures a big quantity nutritional materials for the population and raw materials for the industry, and with that ensures permanent income for the rural economy. Its significant is shown in the share of its production with 50-60% in the total value of the agricultural production in some European

countries, such as: Denmark, the Netherlands, Finland and other. Cattle is the biggest producer of meat and milk, i.e. of the basic highly protein products for human consumption and raw materials for the manufacturing industry. Countries that through livestock breeding ensure at least 70% of the total income in the agriculture are progressed (developed) countries.

Worldwide, about 60% of the animal protein in the population diet are produced by using cattle products, especially in the developed countries, by using the milk, meat and their manufacturing products. Cattle is one of the biggest ruminants that for its own sustainability needs, production and reproduction, use plant feeds and thereof produces high valued products. From here, appears that the production is closely related to the agricultural land.

The ability of cattle for processing large amounts of plant feeds allows intensive use of agricultural land and increase of their yields using manure, thus enriching the soil with humus. In that way, the cattle are part of the biological cycle: soil-plants-cattle-manure-soil. Considering that for its needs it uses specific feed, they are not competitive to the human, which is not the case with the pigs and chickens (poultry) feed (Neskovski, 1988; Kocevski, 2003). One of the main characteristic is the biological characteristic to consume big quantities of high quality voluminous fodder (hay, silage, green forage mass) and thus allows agricultural land to be used two times per year (Azderski & Usaleski, 1997).

Materials and methods

The main database in our research is the State Statistical Office of the Republic of Macedonia, through statistical yearbooks of different years, statistical research on agriculture, as well as data receive by the Agency for food and

veterinary that allow access to its records of marked cattle in the municipalities and villages in the country. Statistical research and yearbooks used are for the last 23 years from the regular censuses of population and agricultural holdings, number of livestock, etc. For comparability of phenomena in development processes, many publications from known authors given in the List of references are used in the analysis (Pacinovski, *et.al.*, 2012; Trajkovski & Bunevski, 2007; Shljahov, 1989).

In the research period are used mainly induction-deductive method, index method, comparative method, method of mean values and other. For better visibility of livestock number, the data are given in tables.

For easier understanding of the livestock situation in the area of the basin of river Bregalnica, we give the number of livestock in the country and in the basin of river in parallel. Our opinion is that in this way more clearly and more descriptive will be shown the present condition, as well as where necessary measures should be taken for improvement of the condition.

In the basin of river exist 19 municipalities with 288 local communities and 206,380 residents. According to the last census of the population in the Republic of Macedonia in 2002, the total population in the country is 2,022,547 residents.

MUNICIPALITUES IN THE BASIN OF RIVER BREGALNICA			
1	BEROVO	8	local communities
2	VINICA	16	local communities
3	GRADSKO	1	local community
4	DELCEVO	21	local communities
5	ZRNOVCI	3	local communities
6	KRIVA PALANKA	1	local community
7	KARBINCI	29	local communities
8	KONCE	14	local communities
9	KOCANI	28	local communities
10	KRATOVO	8	local communities
11	KUMANOVO	1	local communities
12	LOZOVO	11	local communities
13	MAKEDONSKA KAMENICA	9	local communities
14	PEHCEVO	7	local communities
15	PROBISHTIP	37	local communities
16	RADOVISH	3	local communities
17	SVETI NIKKOLE	34	local communities
18	CHESINOVO-OBLESHEVO	14	local communities
19	SHTIP	44	local communities
TOTAL 288 local communities, 206,380 residents in 2002			

Results and discussion

In the period before the war and at the beginning of the war, agriculture was the main economic activity in the Republic of Macedonia. It ensured the basic food products and the only market surpluses (livestock, potatoes, grain, Rakia, leather, dried prunes, agriculture cloth, etc.).

Since a long time ago, livestock breeding in the country had enormous economic value (Azderski, 1996). It was an important economic branch as a source for food products, products for clothes and shoes, as a source of labour in the crop production, giving by-products such as manure, etc.).

The share of agriculture in national income was more than 80% in 1939. Later, important structural changes in the economic and non-economic activities have been realized. As a result of these changes, the share of agriculture in creation of national income in the Republic of Macedonia was 58% in 1953 and 11.8% in 2013 (MAFWE, 2001).

In the past few decades (1991-2013), development of livestock breeding measured according to the total number of livestock heads, decreased for 15.38% (from 325,000 to 275,000 heads) and it was mainly because of lowering of the fodder basis, employment of the labour from villages in the industrial sector, as well as bad economic condition due to the low price of meat, milk, wool, etc (Azderski & Ivanovski, 1994; Azderski, 1992).

Number of cattle in the basin of river Bregalnica

General characteristics of our cattle farming are (Trajkovski & Bunevski, 2006):

- Low milk yield per cow 2,152 litres;
- Very early slaughter of the offspring, in average 124kg live weight;
- Small land property per household 1-3ha;
- Small size of the area under forage in terms of ploughed field, which is 7%, compared to the developed countries where that percentage is 34-40%;
- Small percentage of cows covered with artificial insemination and parent bookkeeping, approximately 6-8% of the population, while before the transition period this percentage was more than 20%;

- Big import of precious breeds, in the first place Holstein-Friesian breed, but after a short time period these breeds are quickly pulled out from production;
- Low information and knowledge on the production technology for highly productive cattle;
- Challenges in production of high quality voluminous feed;
- Insufficient measures built by the country for supporting the farmers; and
- Spending large financial assets to import livestock products and insemination material.

According to the data given in table 1, total number of cattle in the area of the basin of river Bregalnica was 38,032 in 1991, while in 2013 their number decreased to 31,616 heads. It decreased by 6,416 heads or 16.87%. The average value of the total number of cattle was 35,744 heads for the 23 years long period.

The number of cows and heifers in calf was 23,960 heads in 1991, while in 2013 their number was 19,918 heads. It decreased by 4,042 heads or 16.86%. The average number of cows and heifers in calf was 22,518 heads for the 23 years long period.

The total number of cattle younger than 1 year was 7,606 heads in 1991 and in 2013 it was decreased by 6,323 heads. The decreasing of their number is for 1,283 heads or 16.87%. The average number of cattle younger than 1 year was 7,149 heads for the 23 years long period.

The total number of cattle old between 1 and 2 years was 3,803 heads in 1991 and in 2013 they decreased by 3,160 heads. Their number decreased by 643 heads or 16.91%. The average number of cattle old between 1 and 2 years was 3,574 heads for the 23 years period.

The number of cattle older than 2 years was 2,663 heads in 1991 and 2,215 heads in 2013. The decrease in their number is by 448 or 16.82%. The average number of cattle older than 2 years was 2,503 for the 23 years long period.

Projection of the Number of cattle in the area of the basin of river Bregalnica for the period 2014-2020 is given in Annex 3. The trendline and the forecast for the total number of cattle in the area of the basin of river Bregalnica is given in figure 1.

Table 1 – Number of cattle in the area of the basin of river Bregalnica

Year	Total cattle	Cows and heifers in calf	Cattle younger than 1 year	Cattle old between 1 and 2 years	Cattle older than 2 years
1991	38,032	23,960	7,606	3,803	2,663
1992	36,823	23,198	7,364	3,682	2,579
1993	36,554	23,029	7,310	3,655	2,560
1994	41,722	26,284	8,344	4,172	2,922
1995	38,164	24,043	7,632	3,817	2,672
1996	38,152	24,035	7,630	3,814	2,673
1997	37,480	23,612	7,496	3,747	2,625
1998	34,877	21,972	6,975	3,487	2,443
1999	40,062	25,239	8,012	4,004	2,807
2000	34,344	21,636	6,868	3,434	2,406
2001	34,352	21,641	6,870	3,435	2,406
2002	33,771	21,275	6,754	3,377	2,365
2003	35,018	22,061	7,003	3,500	2,454
2004	37,787	23,805	7,557	3,777	2,648
2005	33,430	21,060	6,686	3,343	2,341
2006	34,406	21,675	6,881	3,441	2,409
2007	32,862	20,703	6,572	3,286	2,301
2008	33,053	20,823	6,610	3,305	2,315
2009	37,448	23,592	7,489	3,744	2,623
2010	35,026	22,066	7,005	3,502	2,453
2011	34,365	21,649	6,873	3,436	2,407
2012	32,769	20,644	6,553	3,277	2,295
2013	31,616	19,918	6,323	3,160	2,215
Average	35,744	22,518	7,149	3,574	2,503

Source: Statistical database – Agriculture, livestock 2007, 2008, 2009, 2010, 2011, 2012, 2013 pg. 19, 20, 35 and data received from the Agency for food and veterinary

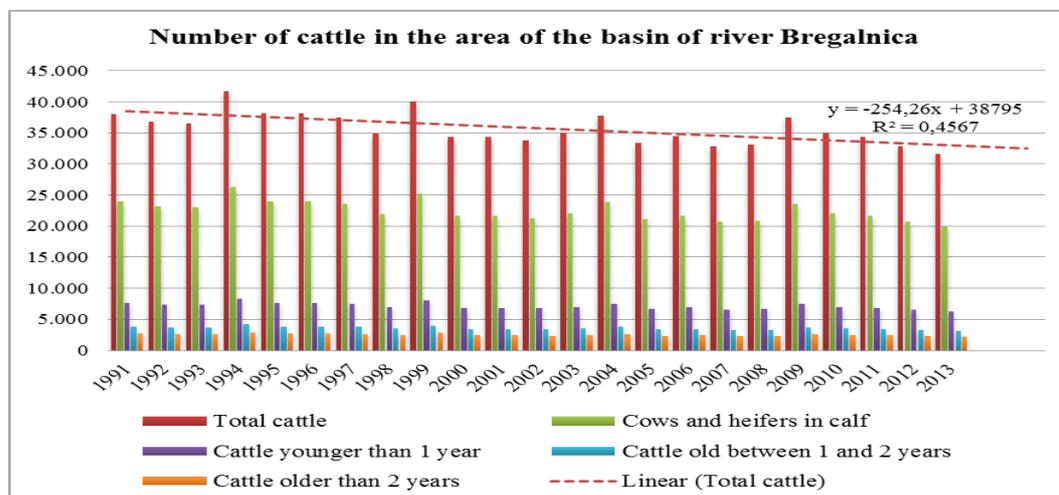


Figure 1 Trendline of the total number of cattle in the area of the basin of river Bregalnica

Cattle farms in the area of the basin of river Bregalnica are located in the following municipalities and villages: municipality Berovo near the village Smojmirovo, and municipalities Delcevo, Vinica, Kocani, Sveti Nikole, Probishtip, Shtip and Lozovo.

Production of cow milk in the basin of river Bregalnica

According to the data in table 2, total milk production in the basin of river Bregalnica was 43,843,000 litres in 1991, while in 2013 the production increased to 63,428,000 litres. The increased is by 19,586,000 litres or 44.67%. The average production of milk was 58,311,000 litres for the 23 years long period.

The total production of cow milk was 31,171,000 litres in 1991, while in 2003 it

increased to 55,889,000 litres. The increased of cow milk production is by 24,718,000 litres or 79.29%. The average number of cow milk production was 47,648,000 litres for the 23 years long period.

The total production of milk per dairy cow was 1,301 litres in 1991, while in 2003 it increased to 2,806 litres. The increased milk per cow is by

1,505 litres or 115.68%. The average number of milk per cow was 2,116 litres for the 23 years long period. Since there are still not officially available data for the years 2014 and 2015, their values are given in the projection by 2020 in Annex 4.

Table 2 – Production of cow and sheep milk in the area of the basin of river Bregalnica

Year	Total milk production in 000 litres	Total production of cow milk in 000 litres	Litres per dairy cow	Total production of sheep milk in 000 litres	Litres per dairy sheep
1991	43,843	31,171	1,301	12,672	37
1992	42,525	30,157	1,300	12,368	35
1993	42,442	30,398	1,320	12,044	32
1994	46,930	33,590	1,278	13,340	35
1995	47,428	33,660	1,400	13,768	39
1996	44,577	33,673	1,401	10,904	40
1997	43,057	32,820	1,390	10,237	41
1998	49,657	41,527	1,890	8,130	40
1999	61,041	53,001	2,100	8,040	41
2000	58,140	49,870	2,305	8,270	44
2001	54,870	45,034	2,081	9,836	50
2002	54,629	43,741	2,056	10,888	58
2003	57,758	46,769	2,120	10,989	59
2004	64,848	54,822	2,303	10,026	46
2005	56,948	46,479	2,207	10,469	56
2006	64,912	53,320	2,460	11,592	61
2007	65,843	58,009	2,802	7,834	62
2008	66,304	58,304	2,800	8,000	64
2009	77,892	70,304	2,980	7,588	65
2010	66,112	59,357	2,690	6,755	57
2011	66,372	60,725	2,805	5,647	49
2012	67,578	59,392	2,877	8,186	73
2013	63,428	55,889	2,806	7,539	69
Average	58,311	47,648	2,116	10,663	50

Source: Statistical database – Agriculture, livestock 2007, 2008, 2009, 2010, 2011, 2012, 2013 pg. 19, 20, 35 and data received from the Agency for food and veterinary

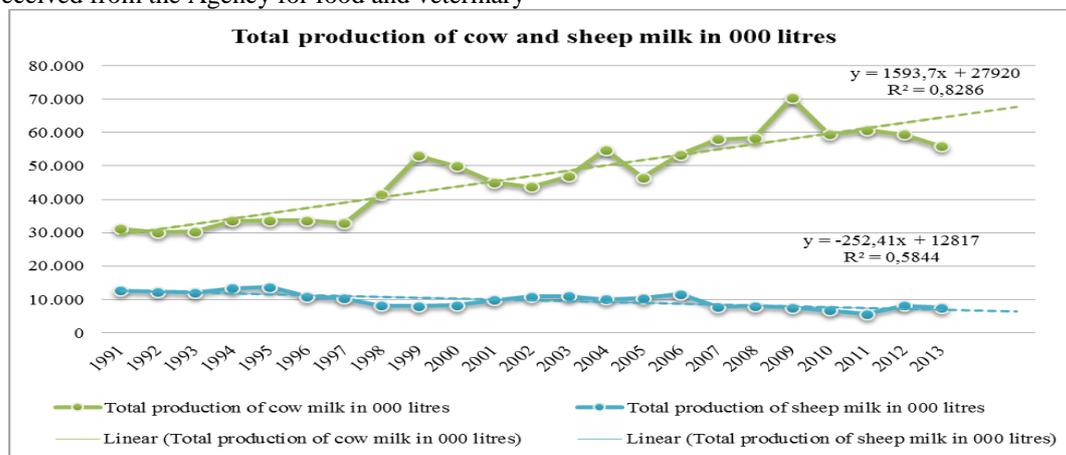


Figure 2 Trendline of the total production of cow and sheep milk in 000 litres in the area of the basin of river Bregalnica

In figure 2 is shown the trendline and the forecast of the total production of cow and sheep milk in 000 litres.

Dairies for collection, storage and processing of sheep's, cow's and aggregate milk in the basin of river Bregalnica are located in: village

Budinarci, village Smojmirovo and the city of Berovo in municipality Berovo, near the village Robovo in municipality Pehcevo, in municipality Delcevo, Vinica, Shtip, Kocani and Sveti Nikole.

Conclusions

According to the data in table 3, the share of cattle breeding in the basin of river Bregalnica

in the total number of cattle in the Republic of Macedonia was 13.51% for the 23 years researched period.

Table 3 - Share of the number of livestock breeding in the basin of river Bregalnica in the total number of livestock in the Republic of Macedonia (in %)

Year	Type of livestock							
	Cattle	Sheep	Goat	Pigs	Poultry	Fish in tons	Beehives	Horses
1991	13.46	21.73	27.89	26.6	6.84	6.7	11.35	8.84
1992	12.92	21.46	26.52	27.97	7.76	8.27	11.58	9.2
1993	13.03	21.86	28.71	27.33	8.38	8.5	12.03	8.58
1994	14.82	22.07	27.77	27.33	8.9	8.37	11.99	9.6
1995	13.46	21.73	27.89	29.17	8.36	6.91	12.6	10.3
1996	12.94	21.46	27.89	29.17	10.09	10.21	13.59	11.88
1997	12.95	21.86	26.52	29.17	10.01	10.2	12.99	12.49
1998	13.04	22.07	28.71	26.11	6.84	7.34	11.99	8.84
1999	14.82	21.73	28.71	26.11	7.76	5.59	12.86	9.11
2000	13.46	21.46	28.71	22.25	8.38	5.5	13.65	9.6
2001	12.95	21.86	28.72	23.53	8.9	8.81	13.39	10.3
2002	13.04	21.73	27.77	26.6	8.36	7.99	12.99	12
2003	13.47	21.46	27.89	27.97	10.01	6.59	12.98	12.99
2004	14.82	21.73	26.52	27.33	10.01	7.63	13.65	11.16
2005	13.46	21.47	28.71	29.17	6.98	11.05	8.44	9.83
2006	13.47	21.73	27.77	29.17	7.76	14.7	7.32	8.65
2007	12.94	22.07	26.52	27.79	6.84	8.47	7.46	8.84
2008	13.04	21.86	17.67	28.72	7.77	6.98	19.94	8.21
2009	14.82	22.07	24.33	31.42	8.39	5.54	10.87	7.27
2010	14.47	21.74	27.9	30.49	9.38	5.4	22.17	16.11
2011	12.95	21.47	26.53	29.56	8.37	5.84	13.6	19.31
2012	13.04	21.87	28.73	31.48	10.1	6.02	12.66	32.81
2013	14.83	22.08	27.78	23.54	10.02	6.57	13.17	33.61
Average	13.51	21.75	27.36	27.72	8.45	6.71	12.8	11.13

Source: Statistical database – Agriculture, livestock 2007, 2008, 2009, 2010, 2011, 2012, 2013 pg. 19, 20, 35 and data received from the Agency for food and veterinary

Share of municipalities in the total number of livestock in the basin of river Bregalnica is shown in table 4. According to the table, share of the total number of livestock of the municipalities in the total number of livestock in the Republic of Macedonia is the following: Berovo 6.0%, Vinica 5.0%, Delcevo 10.0%,

Zrnovci 2.0%, Karbinci 14.0%, Konce 6.0%, Kocani 7.0%, Kratovo 0.4%, Lozovo 2.5%, Makedonska Kamenica 5.0%, Pehcevo 6.0%, Probishtip 7.0%, Radovish, in the basin of river Bregalnica is 2.5%, Sveti Nikole 10.0%, Cesinovo-Obleshevo 5.5% and Shtip 10.7%.

Table 4 – Share of municipalities in the total number of livestock in the basin of river Bregalnica (in %)

Type of livestock								
Municipality	Cattle	Sheep	Goat	Pigs	Poultry	Fish in tons	Beehives	Horse
Berovo	6.0	11.0	7.0	12.0	10.0	20.0	9.0	16.0
Vinica	5.0	6.0	15.0	7.0	8.0	10.0	7.0	9.0
Gradsko	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delcevo	10.0	5.0	10.0	6.0	7.0	6.0	6.0	8.0
Zrnovci	2.0	0.5	2.0	0.5	0.5	0.0	0.5	1.0
Kriva Palanka	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Karbinci	14.0	8.0	10.0	2.0	3.0	0.0	1.0	5.0
Konce	6.0	2.0	2.0	1.0	3.0	0.0	1.0	4.0
Kocani	7.0	3.0	10.0	15.0	15.0	15.0	15.0	7.0
Kratovo	0.4	0.7	2.0	0.3	0.3	0.0	0.4	0.9
Kumanovo	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Lozovo	2.5	4.0	2.2	3.0	4.0	0.0	4.0	4.0
Makedonska Kamenica	5.0	2.5	9.0	6.0	7.0	1.0	12.0	7.0
Pehcevo	6.0	6.0	2.0	5.0	5.0	18.0	4.5	5.0
Probishtip	7.0	10.0	9.0	9.0	6.0	15.0	15.0	7.0
Radovish	2.5	1.0	1.0	1.0	2.0	0.0	1.0	0.5
Sveti Nikole	10.0	17.0	4.0	10.0	10.0	0.0	10.0	6.0
Ceshinovo-Obleshevo	5.5	4.6	3.0	5.0	5.0	0.8	4.0	3.0
Shtip	10.7	18.6	11.7	17.2	14.2	14.2	9.6	16.6
Total	100	100	100	100	100	100	100	100

Source: Statistical overview - Agriculture, livestock 2007, 2008, 2009, 2010, 2011, 2012, 2013 pg. 19, 20, 35 and data received by the Food and Veterinary Agency

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ANNEXES

Annex number 1 – Number of cattle in the Republic of Macedonia, in categories

Year	Total cattle	Cows and heifers in calf	Cattle younger than 1 year	Cattle old 1-2 years	Cattle older than 2 years
1991	282,349	163,733	73,048	21,328	24,240
1992	284,919	164,578	74,104	22,469	23,768
1993	280,324	165,280	76,444	24,210	14,390
1994	281,336	165,813	79,656	21,826	14,041
1995	283,327	166,374	85,159	19,724	12,070
1996	294,613	175,621	82,647	27,518	8,827
1997	289,428	177,383	76,928	26,580	8,537
1998	267,459	166,553	68,534	24,897	7,475
1999	270,147	171,969	63,914	21,362	12,902
2000	254,968	171,745	57,510	22,448	3,265
2001	265,266	174,255	54,899	24,182	11,930
2002	258,973	172,784	54,537	21,501	10,151
2003	259,976	160,810	59,189	25,747	15,230
2004	254,803	161,554	50,231	29,021	13,997
2005	248,185	156,950	52,215	24,425	14,595
2006	255,430	164,013	53,640	25,032	12,745
2007	253,766	143,217	76,150	11,309	23,090
2008	253,473	147,519	68,148	22,983	14,823
2009	252,521	128,628	68,035	19,738	36,120
2010	259,887	135,004	65,553	18,564	40,766
2011	265,299	164,537	47,432	23,920	29,410
2012	251,240	161,012	67,969	16,016	6,243
2013	238,333	136,397	44,755	20,885	11,084
Average	265,479	169,205	55,520	25,909	13,749

Source: Statistical overview - Agriculture, Livestock 2007, 2008, 2009, 2010, 2011, 2012, 2013 pg. 19, 20, 35 and data received by the Food and Veterinary Agency

Annex number 2 – Production of cow and sheep milk in the Republic of Macedonia

Year	Total milk production in 000 litres	Total production of cow milk in 000 litres	Litres per dairy cow	Total production of sheep milk in 000 litres	Litres per dairy sheep
1991	179,479	119,194	1,329	60,285	40
1992	175,790	117,443	1,307	58,347	37
1993	178,030	118,398	1,325	59,632	34
1994	177,179	115,791	1,283	61,388	37
1995	197,834	128,825	1,429	69,009	41
1996	186,639	133,642	1,406	52,997	43
1997	182,663	133,308	1,396	43,355	43
1998	213,208	173,567	1,902	39,641	43
1999	240,331	202,387	2,152	37,944	45
2000	250,400	220,244	2,343	40,156	47
2001	248,390	200,904	2,096	47,486	54
2002	250,057	198,431	2,094	51,626	61
2003	243,999	191,533	2,140	52,466	62
2004	260,774	212,898	2,362	47,876	49
2005	246,164	197,464	2,254	48,700	59
2006	291,290	234,708	2,497	56,582	64
2007	438,168	373,706	2,880	35,473	66
2008	438,069	368,217	2,835	38,296	68
2009	375,556	342,622	3,004	32,934	69
2010	379,260	347,103	2,787	32,157	60
2011	401,671	376,290	2,866	25,381	51
2012	388,385	349,769	2,928	38,616	79
2013	378,300	341,800	2,891	36,500	71
Average	274,856	226,010	2,152	46,384	53

Source: Statistical Yearbook of the Republic of Macedonia 1997, 1999, 2009 and 2014

Annex number 3 – Projection of the number of cattle in the area of the basin of the river Bregalnica

Year	Total cattle	Cows and heifers in calf	Cattle younger than 1 year	Cattle old between 1 and 2 years	Cattle older than 2 years
2014	31,362	19,758	6,272	3,135	2,197
2015	31,107	19,598	6,221	3,109	2,179
2016	30,853	19,437	6,170	3,084	2,162
2017	30,599	19,277	6,120	3,058	2,144
2018	30,345	19,117	6,069	3,033	2,126
2019	30,090	18,957	6,018	3,007	2,108
2020	29,836	18,797	5,967	2,982	2,090

Annex number 4 – Projection of the cow and sheep milk in the area of the basin of river Bregalnica

Year	Total milk production in 000 litres	Total production of cow milk in 000 litres	Litres per dairy cow	Total production of sheep milk in 000 litres	Litres per dairy sheep
2014	64,769	57,483	2,891	7,287	70.6146
2015	66,111	59,076	2,976	7,034	72.2292
2016	67,452	60,670	3,061	6,782	73.8438
2017	68,793	62,264	3,146	6,529	75.4584
2018	70,135	63,858	3,232	6,277	77.073
2019	71,476	65,451	3,317	6,025	78.6876
2020	72,817	67,045	3,402	5,772	80.3022