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# INTERNATIONAL, EUROPEAN AND ROMANIAN DEVELOPMENTS RELATED TO THE DAIRY COWS: LIVESTOCK AND PRODUCTION OBTAINED

ALECU IOAN-NICULAE<sup>1</sup>, NAGY CAROLY<sup>2</sup>, GYORGY SZABO<sup>3</sup>, ANGELESCU IRINA<sup>4</sup>

**Abstract:** *Considering the population growth and the need to ensure food security, and also the fact that milk represents one of the basic foods in the diet of children and of adults, this paper seeks to obtain an image that is as accurate as possible of the evolution of dairy cow sector, at the global and European level and also in Romania. By using as working method the direct observation without intervention and by consulting the specialized bibliographical references, we have tried to select the most representative statistical data allowing us a proper analysis of the development of dairy cow sector. The analysis of the development of this sector at the international and European level indicated that the results obtained are decisively influenced by the production potential of the biological material and by the development of the exploitation technologies. Over time, the evolution of livestock was different, according to the development level of countries located in different geographical areas. While in areas such as North America and Europe, a decrease of livestock was noticed, at the same time a significant increase of production, in Africa and Asia, the increase of milk production was almost exclusively accomplished by increasing the cattle herd. In Romania, since 1989, the dairy cow sector has been undergoing a strengthening and development process, and the Ministry of Agriculture and Rural Development, by the National Strategy for the Development of the Livestock Sector establishes clear objectives and priorities for its support. The analysis performed allows us to consider that, at least for Romania, the dairy cow sector is yet an inadequately capitalized opportunity that could place our country as a front-runner on the European market.*

**Key words:** *dairy cows, livestock evolution, milk production, modern technologies, biologic material*

## INTRODUCTION

Considering the special attention given to the food safety and the fact that milk is a basic food product, with a special impact on the harmonious growth of children, and also on the healthy diet of adults, the importance of raising dairy cattle has increased in the last years, being also a significant source of income for the producers.

At global level, the bovine milk production is ranked at the first place, followed by ovine and caprine milk production. However, it has to be noticed that in some areas around the globe, other sources of milk exist, such as mare, llama, yak, zebu, camel, donkey and others.

It also has to be mentioned that, while in the developed countries, milk is produced in intensive exploitations for dairy cattle raising, with modern technologies and high efficiency, in the developing countries, milk is produced by small producers for which this activity represents an important source of income.

The developed countries accomplish approximately 70% of the global milk production and only 30% are produced in the developing countries, being also noticed that, in the last years, while in the developed countries, there has been a tendency to diminish cow milk production, in the developing countries, it has highly increased.

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## MATERIAL AND METHOD

Livestock farming is an important component of a sustainable agriculture, contributing to the general development of agriculture and the long term evolution of rural area. Starting from its current and prospective importance, this paper analysed and explained the evolution of dairy cow herds and yield, at global, European and Romanian level, from 1980 to 2012. This analysis is based on statistical data offered by the Ministry of Agriculture and Rural Development in Romania, FAO and EUROSTAT.

## RESULTS AND DISCUSSIONS

Currently, at global level, the trends regarding cattle raising and exploitation are related to two issues: on one hand, the increase of livestock, and on the other hand, the continuous increase of production. Results obtained in cattle farming are mainly determined, more than in other sectors, by the production potential of the biologic material and streamlining the exploitation technology by concentration, specialisation and increasing of intensiveness.

The fast rate of agricultural development in the last decades, as a result of intensiveness increase, continuous upgrading of the exploitation technologies etc. has led undoubtedly in the developed countries to individual average productions of more than 8,000 kg of milk for the majority of specialized dairy breeds, with a possible future increase to 9,000 kg. Unfortunately, the gap in comparison to the less developed countries is very wide.

The requirements and the development pace of society have imposed different directions to the breeders regarding the evolution of livestock and milk production. But, in general, the accentuated population growth has also led to the increase of foodstuff demand, that may be solved only by increasing the production supported by the use of modern production technologies.

### Global and European current situation of dairy cow raising

In the last 20 years, the bovine herds have increased with 12.6%, with an average of 0.74% per years, being noticed that this value has decreased during that period (Table 1). During this period, in Africa, South America and Asia, the increase was of 45.3%, 18.44% and 16.6% respectively, compared to 1995. The situation was different in North America and Europe where, due to the political and economic changes in the majority of ex-communist countries, a decrease of the total bovine herds is noticed in the developed countries, at the same time as the increase of their production potential.

The most numerous herds are in Asia, namely 34.44% of the total bovine herds existent at global level in 2012, fact that is undoubtedly determined by the large area of this continent compared to the other continents. Asia is followed by South America (23.46%), Africa (20.15%), Europa (8.2%), North America (6.9%), and Oceania (2.6%). (Table 1)

**Table 1. Evolution of cowherds, total and by continents during the period 1995-2012 (thousand head)**

| COWS          | YEARS     |           |           |           |           | Increase in 2012 compared to 1995 |       |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------------------------------|-------|
|               | 1995      | 2000      | 2005      | 2010      | 2012      | Thousand head                     | %     |
| TOTAL GLOBAL  | 1,313,094 | 1,302,894 | 1,355,947 | 1,371,166 | 1,478,720 | 165,626                           | 12.6  |
| AFRICA        | 202,942   | 226,624   | 250,492   | 285,504   | 297,987   | 95,045                            | 45.3  |
| NORTH AMERICA | 115,494   | 111,400   | 110,363   | 106,895   | 103,074   | -12,420                           | -     |
| SOUTH         | 293,005   | 292,797   | 315,057   | 322,791   | 347,055   | 54,050                            | 18.44 |

|         |         |         |         |         |         |         |      |
|---------|---------|---------|---------|---------|---------|---------|------|
| AMERICA |         |         |         |         |         |         |      |
| ASIA    | 436,743 | 463,260 | 471,327 | 480,312 | 509,297 | 126,604 | 16.6 |
| EUROPE  | 178,332 | 150,647 | 140,749 | 138,300 | 121,797 | -56,535 | -    |
| OCEANIA | 35,778  | 36,094  | 38,220  | 37,586  | 39,345  | 3,567   | 9.9  |

The increase trend was also registered for bovines raised and exploited for milk, the differences between areas being maintained, but in different proportions, by continents. Thus, the number of dairy cattle has increased from 1980 to 2012 with 56,685 thousand head, namely with 26.58% in average per year, at global level (Table 2). The highest increase is noticed in the developing countries also, in Africa (304.05%), Asia (220.76%) and South America (44.58%). The most important livestock decrease was in North America (-48.49%) and Europe (-40.29) (Table 2).

**Table 2. Evolution of cowherds raised for milk production at the global level in the period 1980-2012 (thousand head)**

| SPECIFICATIONS | YEARS   |         |         |         |         | 2012/<br>1980 | Out of<br>total<br>(%) |
|----------------|---------|---------|---------|---------|---------|---------------|------------------------|
|                | 1980    | 1990    | 2000    | 2010    | 2012    |               |                        |
| TOTAL GLOBAL   | 213,192 | 223,296 | 226,863 | 262,773 | 269,877 | 56,685        | 26.58                  |
| AFRICA         | 21,993  | 29,047  | 41,742  | 64,497  | 66,870  | 44,877        | 304.05                 |
| NORTH AMERICA  | 21,015  | 19,556  | 20,484  | 10,090  | 10,192  | -10,823       | -48.49                 |
| SOUTH AMERICA  | 25,203  | 28,698  | 31,224  | 36,304  | 36,441  | 11,238        | 44.58                  |
| ASIA           | 47,531  | 55,032  | 77,134  | 99,969  | 104,933 | 57,402        | 220.76                 |
| EUROPE         | 93,536  | 87,022  | 50,714  | 38,745  | 37,693  | -55,843       | -40.29                 |
| OCEANIA        | 3,914   | 3,941   | 5,563   | 6,285   | 6,763   | 2,879         | 173.55                 |

In the European Union, the only states that have registered increases of livestock during the period 2000-2012 were: Croatia, Cyprus, Greece, Latvia and Portugal. However, we may consider that these increases were not significant, compared to the decrease of livestock in the other member states. The highest livestock decrease was registered in Germany, namely 2,181 thousand head. It can be noticed that our country is ranked at the second place, with 1,062 thousand head. (Table 3)

**Table 3. Evolution of cow livestock in the European Union during the period 2000-2012 (thousand head)**

| Country         | 2000          | 2005          | 2010          | 2012          |
|-----------------|---------------|---------------|---------------|---------------|
| <b>Total EU</b> | <b>98,063</b> | <b>91,779</b> | <b>89,864</b> | <b>88,137</b> |
| Austria         | 2,172         | 2,011         | 2,026         | 1,976         |
| Belgium         | 3,041         | 2,699         | 2,593         | 2,484         |
| Bulgaria        | 682           | 671           | 563           | 558           |
| Croatia         | 426           | 471           | 444           | 452           |
| Cyprus          | 54            | 61            | 54            | 57            |
| Czech Republic  | 1,573         | 1,397         | 1,328         | 1,354         |
| Denmark         | 1,868         | 1,570         | 1,571         | 1,607         |
| Estonia         | 267           | 250           | 235           | 246           |
| Finland         | 1,057         | 959           | 926           | 913           |
| France          | 20,310        | 19,310        | 19,546        | 19,005        |
| Germany         | 14,658        | 13,034        | 12,809        | 12,477        |
| Greece          | 602           | 605           | 679           | 685           |
| Ireland         | 7,037         | 6,982         | 6,606         | 6,754         |
| Italy           | 7,162         | 6,304         | 6,103         | 6,252         |
| Latvia          | 378           | 371           | 378           | 381           |
| Lithuania       | 898           | 792           | 759           | 752           |

|                 |        |        |        |       |
|-----------------|--------|--------|--------|-------|
| Luxembourg      | 205    | 185    | 199    | 188   |
| Malta           | 19     | 19     | 15     | 15    |
| Great Britain   | 11,133 | 10,770 | 10,112 | 9,900 |
| the Netherlands | 4,070  | 3,799  | 3,975  | 3,879 |
| Poland          | 6,083  | 5,483  | 5,724  | 5,777 |
| Portugal        | 1,421  | 1,443  | 1,447  | 1,497 |
| Romania         | 3,051  | 2,808  | 2,512  | 1,989 |
| Slovakia        | 665    | 540    | 472    | 463   |
| Slovenia        | 471    | 451    | 473    | 462   |
| Spain           | 6,217  | 6,463  | 6,075  | 5,813 |
| Sweden          | 1,687  | 1,605  | 1,537  | 1,500 |
| Hungary         | 857    | 723    | 700    | 698   |

Source: FAOSTAT data processing

### Global and European milk production

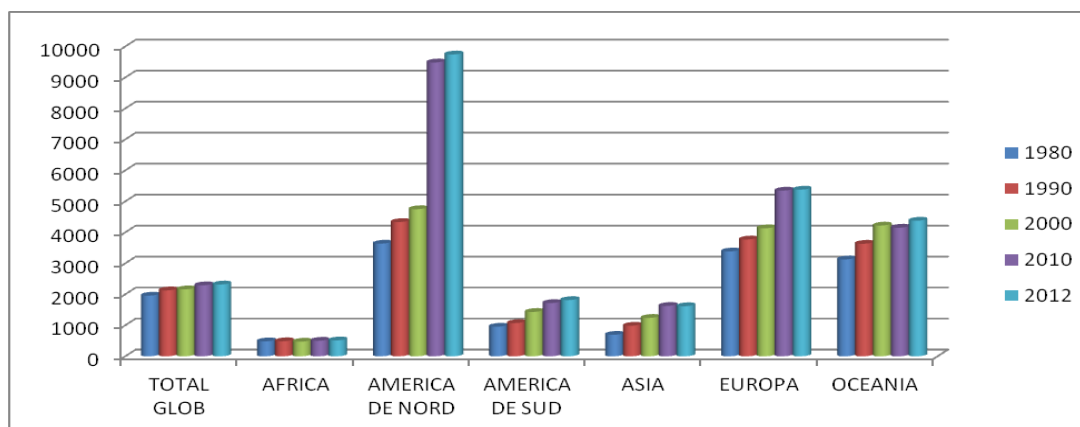
As regards milk production increase, in the developing countries, it was based mainly on the increase of cow livestock, compared to the developed countries where this increase was based especially on a continuous development at the individual level of production, resulted from advanced breeding and exploitation techniques, biologic material of high quality etc. Hence, in the highly industrialised countries, a drastic drop of livestock was registered, at the same time with a strong growth of average milk production (Table 4).

**Table 4. Evolution of average cow milk production at the global level (kg/head)**

| SPECIFICATIONS | 1980 | 1990 | 2000 | 2010 | 2012 | EVOLUTION<br>2012/1980 |       |
|----------------|------|------|------|------|------|------------------------|-------|
|                |      |      |      |      |      | Kg/head                | %     |
| TOTAL GLOBAL   | 1957 | 2129 | 2162 | 2292 | 2318 | 361                    | 18.44 |
| AFRICA         | 483  | 487  | 473  | 503  | 513  | 30                     | 6.2   |
| NORTH AMERICA  | 3638 | 4334 | 4749 | 9485 | 9744 | 6106                   | 267.8 |
| SOUTH AMERICA  | 956  | 1073 | 1432 | 1720 | 1816 | 1899                   | 89.9  |
| ASIA           | 695  | 987  | 1241 | 1626 | 1617 | 922                    | 232.6 |
| EUROPE         | 3385 | 3771 | 4133 | 5348 | 5380 | 1995                   | 58.9  |
| OCEANIA        | 3128 | 3633 | 4221 | 4152 | 4377 | 1249                   | 39.9  |

Source: FAOSTAT data processing

**Figure 1. Dynamics of average milk production at the global level**



Following the analysis of total milk production, the conclusion is that it is determined mostly by the evolution of the cow livestock, but with significant differences resulted from the development level of the states located in the reference area.

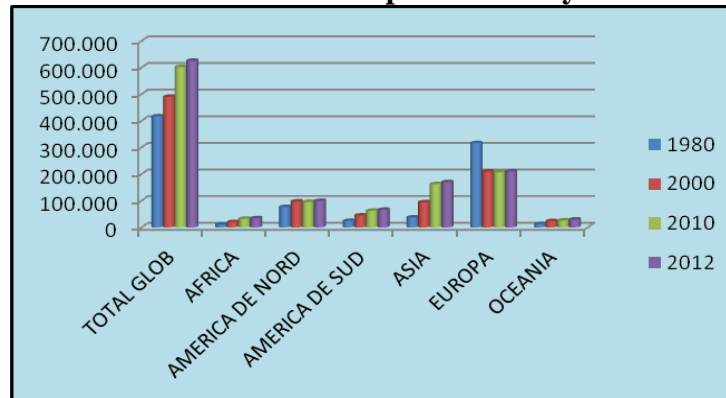
In 2012, compared to 1980, the total global milk production has registered an increase of 49.9 but with a different repartition by continents. Thus, the milk production in Asia has increased 4 times compared to 1980, with 457%. In the last three decades, there are also production increases in South America - 274.6%, Africa - 322.9% etc. (Table 5)

**Table 5. Evolution of total milk production by continent (thousand ton)**

| Area          | YEARS   |         |         |         | EVOLUTION<br>2012/1980 |       |
|---------------|---------|---------|---------|---------|------------------------|-------|
|               | 1980    | 2000    | 2010    | 2012    | 2012/1980              | %     |
| TOTAL GLOBAL  | 417,216 | 490,610 | 602,444 | 625,754 | 208,538                | 49.9  |
| AFRICA        | 10,622  | 19,762  | 32,496  | 34,306  | 23,684                 | 322.9 |
| NORTH AMERICA | 76,452  | 97,290  | 95,718  | 99,316  | -22,864                | -22.0 |
| SOUTH AMERICA | 24,094  | 44,721  | 62,454  | 66,185  | 42,091                 | 274.6 |
| ASIA          | 37,137  | 94,449  | 162,552 | 169,765 | 132,628                | 457.1 |
| EUROPE        | 316,619 | 209,718 | 207,235 | 210,336 | -106,283               | -66.4 |
| OCEANIA       | 12,242  | 23,485  | 26,103  | 29,603  | 17,361                 | 241.8 |

Source: FAOSTAT data processing

**Figure 2. Evolution of total milk production by continent**



As regards the total milk production in the European Union, the variations are rather high. The sharpest decrease was in Poland (3813 thousand ton), France (3309), Great Britain (2090) and Germany (1553), in general due to livestock diminishing. It has to be noticed also that countries like Germany, France and Great Britain have compensated the livestock decrease by very high yields. The only countries that have registered increases are the ex-communist countries, such as Czech Republic, Estonia, Latvia, Lithuania, and also Portugal, Malta, Luxembourg. The highest increases are registered by Portugal, 1181 ton, and Romania, 334 ton. In general, the total production increases are closely connected to the livestock increases, but, as a positive fact for Romania, the increase is based on yield.

**Table 6. Dynamics of total milk production in European Union (thousand ton)**

| Country  | 1980  | 1990  | 2000  | 2010  | 2012  |
|----------|-------|-------|-------|-------|-------|
| Austria  | 3,430 | 3,350 | 3,340 | 3,258 | 3,382 |
| Belgium  |       |       | 3,689 | 3,067 | 3,432 |
| Belgium- | 4,033 | 3,900 |       |       |       |

|                 |        |        |        |        |        |
|-----------------|--------|--------|--------|--------|--------|
| Luxembourg      |        |        |        |        |        |
| Bulgaria        | 1,828  | 2,101  | 1,410  | 1,124  | 1,093  |
| Croatia         |        |        | 606    | 769    | 786    |
| Cyprus          | 33     | 100    | 146    | 151    | 153    |
| Czech Republic  |        |        | 2,789  | 2,683  | 2,814  |
| Denmark         | 5,117  | 4,741  | 4,719  | 4,909  | 5,008  |
| Estonia         |        |        | 629    | 675    | 720    |
| Finland         | 3,275  | 2,816  | 2,450  | 2,336  | 2,296  |
| France          | 27,292 | 26,135 | 24,998 | 23,331 | 23,983 |
| Germany         | 32,059 | 31,307 | 28,331 | 29,616 | 30,506 |
| Greece          | 665    | 618    | 748    | 852    | 800    |
| Hungary         | 2,544  | 2,846  | 2,142  | 1,684  | 1,798  |
| Ireland         | 4,717  | 5,402  | 5,159  | 53,270 | 5,379  |
| Italy           | 10,644 | 11,120 | 12,309 | 10,500 | 10,579 |
| Latvia          |        |        | 823    | 831    | 870    |
| Lithuania       |        |        | 1,713  | 1,732  | 1,774  |
| Luxembourg      |        |        | 264    | 295    | 289    |
| Malta           | 28     | 24     | 48     | 42     | 43     |
| the Netherlands | 11,785 | 11,226 | 11,155 | 11,626 | 11,675 |
| Poland          | 16,480 | 15,832 | 11,889 | 12,278 | 12,667 |
| Portugal        | 757    | 1,530  | 1,997  | 1,897  | 1,938  |
| Romania         | 3,995  | 3,408  | 4,301  | 4,410  | 4,329  |
| Slovakia        |        |        | 1,067  | 917    | 973    |
| Slovenia        |        |        | 649    | 625    | 601    |
| Spain           | 6,053  | 5,825  | 6,106  | 6,357  | 6,313  |
| Sweden          | 3,465  | 3,508  | 3,348  | 2,902  | 2,901  |
| Great Britain   | 15,974 | 15,251 | 14,488 | 14,071 | 13,884 |

Source: FAOSTAT data processing

### **Evolution of dairy cow livestock and of production in Romania**

For Romania, bovines represent one of the most important species of the farm animals, and their breeding has to be analysed from two points of view: on one hand, the industrial, intensive exploitation, where livestock is concentrated in small areas and a high milk yield is obtained, and, on the other hand, the subsistence farms. The subsistence farms include the majority of cows in the country, cattle rearing being the base occupation in the rural areas, providing low, but regular family incomes, especially in the mountainous and semi-mountainous areas.

The current situation of the cattle farming sector and of others is the result of the social and economic changes that took place in Romania following the 1989 Revolution.

Until 1990, in the years of planned economy, the evolution had been characterized by the increase of livestock, the annual average being 2.89%. Since 1990, a sharp decline of livestock has started, currently having the lowest total livestock in 100 years. An important consequence of this radical transformation in Romania is the lowest bovine load per 100 ha of agricultural land among the European countries, of only 15 heads, out of which 11.74 are cows.

A positive feature has to be mentioned, that has been registered in the last years, namely the ascending evolution of the total milk production, as a result of the individual performances of cows. Although the production obtained from a suckling cow has a modest level compared to other European states, it registers an annual average increase of 4.07%.

The data from MARD show the following situation regarding the evolution of livestock and of yields from 1989 and until now:

**Table 1. Dynamics of reproductive herds and of milk production during the period 1989-2001-2013**

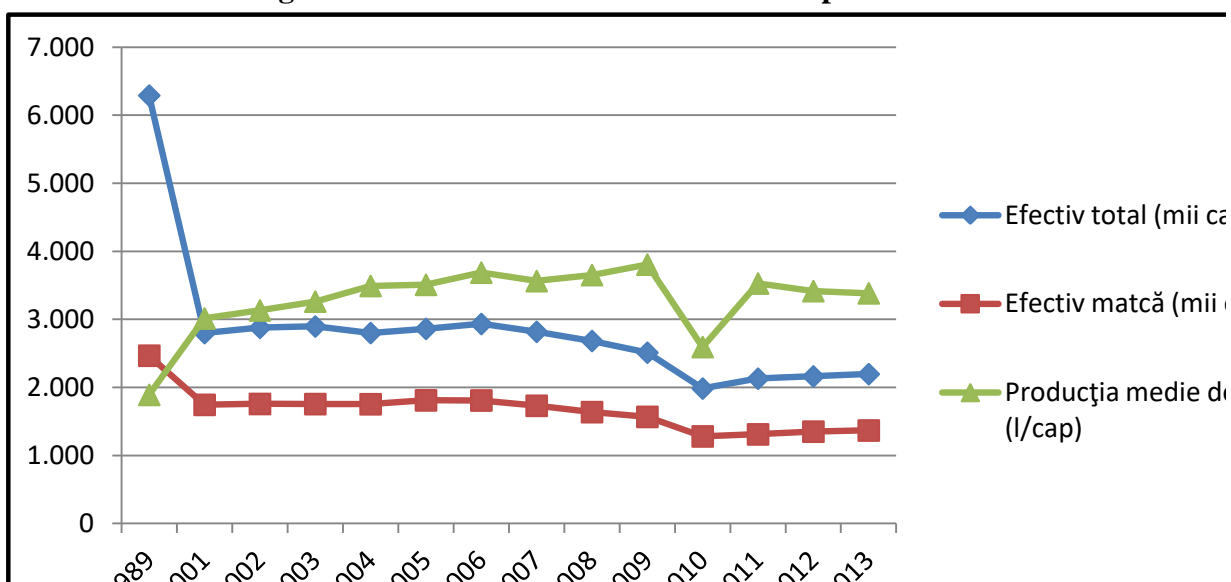
| SPECIFICATIONS                       | MU            | 1989   | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   |
|--------------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| Total livestock out of which:        | thousand head | 6,291  | 2,800  | 2,878  | 2,897  | 2,801  | 2,862  | 2,934  |
| Reproductive herd                    |               | 2,468  | 1,746  | 1,759  | 1,757  | 1,755  | 1,812  | 1,810  |
| Average milk production              | l/head        | 1,892  | 3,014  | 3,133  | 3,263  | 3,493  | 3,510  | 3,688  |
| Total milk production, out of which: | thousand hl   | 41,195 | 51,000 | 52,761 | 55,288 | 55,444 | 55,334 | 58,307 |
| Goods production                     |               | -      | 24,017 | 5,006  | 25,937 | 27,629 | 28,000 | 28,834 |

| SPECIFICATIONS                       | MU            | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|--------------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| Total livestock out of which:        | thousand head | 2,819  | 2,684  | 2,512  | 1,985  | 2,130  | 2,164  | 2,197  |
| Reproductive herd                    |               | 1,732  | 1,639  | 1,569  | 1,282  | 1,312  | 1,352  | 1,369  |
| Average milk production              | l/head        | 3,564  | 3,653  | 3,807  | 2,595  | 3,529  | 3,417  | 3,385  |
| Total milk production, out of which: | thousand hl   | 54,875 | 53,089 | 50,570 | 42,824 | 43,807 | 42,036 | 42,600 |
| Goods production                     |               | 26,868 | 28,197 | 25,310 | 17,433 | 22,321 | 21,462 | 21,894 |

Source: MARD

**Figure 3. Evolution of livestock and milk production**



As regards the development of dairy cow sector in Romania, the National Strategy for the Development of Livestock Sector has the following main objectives:

- Recovery of the cattle rearing sector, in view of stimulating cow milk production.
- Providing the necessary of milk and dairy products at the level of European standards.
- Ensuring the food security of population with milk and dairy products.
- Accomplishing an optimum load of animals per area unit in view of using the production potential of the forage area.
- Stimulating the setting up of efficient and competitive farms by switching from the production used for own consumption to the commercial production.
- The financial support of milk production, in order to compensate the valuation price at the producer using the same criteria as in EU.



## CONCLUSIONS

The analysis has shown the following features:

- At the global level, in the last 20 years, the cattle herds have increased with 12.6% per total.
- In areas such as Africa, South America and Asia, the increases have been higher than in the developed areas of the globe. However, in North America and Europe, a livestock diminishing phenomenon is noticed, at the same time as the increase of its production potential.
- In the developing countries, the increase of total milk production was accomplished mainly with the help of increasing the cattle herds, while in the developed countries, this increase was obtained mainly by the modernization and continuous upgrading of production and exploitation technologies
- At the level of the European Union, few states have registered increases of dairy cow herds. The same countries have also registered production increases, while countries like Germany, France and Great Britain have compensated the livestock decrease by very high yields.
- In Romania, the dairy cow sector still represents an inadequately capitalized resource.

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