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IMPROVING QUALITY MANAGEMENT IN THE BEEF INDUSTRY

Abstract: *In order to improve quality management in the beef industry, we need to implement a quality management and general requirements. This system needs to be enforced in any animal farm or beef processing unit and should consist in identifying the necessary processes, determining the succession and interaction of processes, determining the criteria and methods that ensure efficient control of processes, ensuring availability of resources and information in order to monitor processes, monitoring, measuring and analysing processes, implementing actions to achieve targets and improve the processes necessary to implement a quality management system.*
Keywords: *quality management, beef, cattle, technological factors, pH*

1. INTRODUCTION

The socio-economic importance of raising cattle at both world and domestic (Romania) levels consist in the fact that:
a) It is a sustainable and prospective activity due to:
- The low consumption of energy though, according to some authors, animal production ranks second after energy production from the point of view of global greenhouse gas emissions [1].
- The diversity of productions.
- The nature of fodder it valorises.

b) It ensures labour force stability in the rural and mountain areas.
c) It is a traditional activity of the rural area and, particularly, of the mountain area.
d) It is a source of trade.
e) It can achieve profitable productions for:
- The coverage of the necessary beef exports.
- The coverage of the necessary domestic beef.

The socio-economic importance of raising cattle at world and national levels determined the new direction of the agrarian policy of Romania, i.e. the following specific goals [2]:
a) Ensuring the conditions to achieve the cattle production potential.
b) Ensuring incomes through the valorisation of export production.
c) Increasing the carcass meat ratio by increasing slaughtering weight.
d) Aligning the cattle improvement activity to the European Union standards.
e) Promoting cattle improvement activities in to increase and improve beef production.
f) Stimulating the increase of the number of cattle in mountain areas fir for animal breeding.

Supporting financially the establishment of associations to represent the interests of suppliers of inputs and of product beneficiaries.

Beef has been defined as ***the meat***

striated muscles together with all the tissues that are naturally connected, i.e. conjunctive tissues (lax, fibrous, cartilaginous, adipose and bony) as well as the nerves, blood vessels and lymph ganglions.

From a technological point of view, they distinguish between the following three beef categories:

a) *Choice beef*, meat with no tendons, fascia, aponeuroses, neuro-vascular cordons, blood vessels, ganglions or fat.
b) *Beef with bones*, the muscles and adjacent boned and other specific structural components.
c) *Lean beef*, no bones, but with the rest of tissues.

From a morphological point of view, meat contains 12% conjunctive tissue, 3-23% fat tissue, 40-50% muscular tissue, and 18-20% bony tissue.

As for the notion "meat quality", we can say that it is used with different meanings: **for the consumer**, meat is high quality when it contains not much fat, but is succulent and has the specific flavour of mature meat; **for the nutritionist**, "meat quality" is determined by its content in the main trophins (proteins, lipids) and other substances (vitamins, mineral salts) and by the contamination or pollution substances. "Meat quality" is also the sum of ***hygiene and toxicological, nutritious, sensory and technological factors*** [3- 6].

2. MATERIAL AND METHOD

To carry out the present scientific research, we analysed statistically the number and production of cattle in Western Romania, as well as the factors that impact meat quality, emphasising technological factors aiming at suggesting measures for the improvement of quality management in the beef industry.

3. RESULTS AND DISCUSSION

Due to the fact that Western Romania (counties of Timiş, Arad, Hunedoara, and Caraş-Severin) ensure proper conditions for the raising and exploitation of the cattle (high production of grains and technical crops), this occupation has been a major one for the inhabitants of the area [7]. The cattle are raised in both individual households and specialised units; the region is well known particularly for swine raising and, lately, for sheep and goats raising, while cattle are raised mainly in individual households and in smaller numbers (Table 1).

Table 1. Dynamics of cattle in the Timiş County between 2007 and 2010 (thousands of heads)

	2007	2008	2009	2010
Cattle	61.6	52.1	48.0	38.0
Of which: private sector	61.0	51.7	47.7	37.6
cows, buffalo cows, heifers	36.6	30.2	30.0	26.0
Of which: private sector	36.3	30.0	29.8	25.8

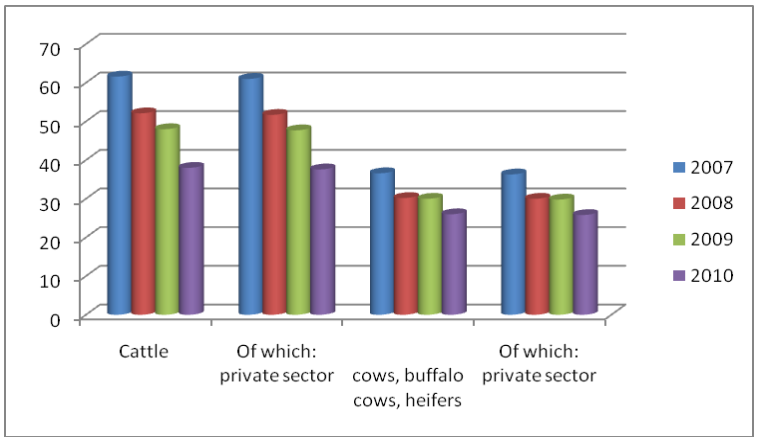

Figure 1. Dynamics of cattle in the Timiş County between 2007 and 2010

The number of cattle in the Timiş County has steadily decreased between 2007 and 2010, 23.600 heads less in 2010 compared to 2007; this shows that the farmers in this area are not interested in exploiting this species, which determined an increase of imports of milk, dairy produce and beef carcasses.

Analysing the number of cattle per 100 ha in the Timiş County, we can see that, during the epriod analysed, the number of cattle per 100 ha at the end of 2010 was 5.800 heads.

As for the meat production, the Timiş County produces 6.86% of the total meat produced in Romania and 51.46% of the total meat produced in the Region West, which ranks it first from the point of view of the meat production in the Region West. As far as beef production is concerned, the Timiş County, though relying on resources, produces only below 1% of the meat produced at national level and 14% of the total beef produced at the level of the region. The largest amount of beef in the Region West is produced by the Hunedoara County (31.3%) (Table 3).

The **technological factors** impacting beef quality are ***hydration capacity***, ***water holding capacity***, ***pH*** and ***redox potential***.

Table 2. Number of cattle per 100 ha

Species	**2007**	**2008**	**2009**	**2010**
Cattle	10.2	7.9	11.2	5.8

Table 3. Animal productions in 2010

Production		UM	Total Romania	Total Western area	County			
					Arad	Caraş-Severin	Hunedoara	**Timiş**
Total meat	Total	Tons live weight	1,305,260	174,185	37,446	23,061	24,025	**89,653**
	Of which: Private ownership		1,303,898	174,043	37,353	23,060	24,021	**89,609**
Beef	Total	Tons Live weight	205,347	12,880	3,861	3,127	4,031	**1,861**
	Of which: Private ownership		204,783	12,819	3,824	3,127	4,031	**1,837**

Hydration capacity is ***the capacity of meat of absorbing water when introduced into a liquid*** (water, NaCl solution) resulting in an increase of volume and weight, a weakening of the structure and a loss of soluble substances in the contact liquid. The water holding and hydration capacity are determined by the technological processes of processing (mechanical processing, addition of NaCl, polyphosphates, thermal processing, cold processing); gender; fattening state; physiological state of the animals before slaughtering; thermal state of meat; age.

Water holding capacity is the ***force with which meat proteins retain part of the meat water or part of the meat water and part of the water added under the action of an outer force***, for instance under pressure or in a centrifuge field, or after previous heating. The term "water holding capacity" involves, thus, the existence of bound and free water.

Beef pH depends on the post-slaughter period: thus, warm, normal beef has a pH of 7.1-7.2 right after slaughter, a pH of 5.5-5.6 during rigidity, and a pH of 5.8-6.0 during maturation [8].

Taking into account the standard SR 2713/2008 concerning the freshness of beef, we analysed a few samples of beef with a pH-meter to determine the freshness of beef marketed in Western Romania (Table 4). The beef marketed in Western Romania is represented by 12.40% warm, normal beef (pH 6.90) or during rigidity (pH 5.50), while the rest of the samples range within standard values concerning meat freshness. Other 18 samples analysed are at the upper limit (pH 6.2) of meat freshness.

In order to improve quality management in the beef industry, we need, first, a system of quality management and general requirements, all well planned and documented [9, 10]. This system of quality management concerns identifying the processes necessary to the system of quality management, determining the succession and interaction of processes necessary to the system of quality management, determining the criteria and methods that ensure efficient control of processes necessary to the system of quality management, ensuring availability of resources and information in order to monitor processes, monitoring, measuring and analysing processes necessary to the system of quality management, implementing actions to achieve targets and improve the processes necessary to implement a quality management system.

Table 4. Analysis of pH in beef marketed in Western Romania

	Number of samples	STAS	Value upon analysis
	5	5.6-6.2	6.20
	10		5.88
	21		5.66
	13		5.65
	8		5.62
	18		6.20
	26		6.00
	33		5.70
	12		6.90
	7		5.50
TOTAL	**153**		

4. CONCLUSION

The main mission of any cattle unit aiming at reaching quality management is to meet the needs and desires of its customers from the point of view of meat features since long- and short-term survival is possible if services are adapted to the consumers' needs. Quality is what consumers desire and not what a cattle unit decides.

As a result of research, we could see that meat ranges technologically within standards concerning meat pH with only some samples at the upper limit of pH pointing to meat freshness, which shows that quality management in the beef industry is not strictly observed.

REFERENCES:

[1] Kanaly, R. A., Manzanero, L. I. O., Macer, D., & Panneerselvam, S. (2009). *Energy Flow, Environment and Ethical Implications for Meat Production*. Ethics and Climate Change in Asia and the Pacific (ECCAP) Project, RUSHSAP, UNESCO, Bangkok.

[2] *Agricultura României*. (2010). Retrieved from http://www.madr.ro/pages/raport/agricultura-romaniei-feb2010.pdf

[3] Arvanitoyannis, I. S., Varzakas, T. H., & Tserkezou, P. (2009). Meat and Meat Products. In Ioannis S. Arvanitoyannis (Ed.), *HACCP and ISO 22000. Application to Foods of Animal Origin* (pp. 181-276). Oxford: Wiley-Blackwell.

[4] Dima, D., Diaconescu, I., Pamfilie, R., Procopie, R., Bobe, M., Păunescu, C., … Chiru, L. (2005). *Fundamentele ştiinţei mărfurilor. Mărfuri alimentare*. Bucureşti: Editura ASE.

[5] Hilton, W. M. (2010). *Beef Quality Assurance Injection Sites and Techniques*. Purdue Extension. Retrieved from http://www.extension.purdue.edu/extmedia/VY/VY-60-W.pdf

[6] Raghu, H. V., Manju, G., Manjunatha, B. M., Mishra, S., & Sawale, P. (2012). Beneficial face of bacteriophages: applications in food processing. *International Journal for Quality research, 6*(2), 101-108**.**

[7] Trifu C., Petroman, I., Petroman, C., Marin, D., Ivu, M., Peţ, I., … Pîrvu, M. (2011). Evolution and current situation of cattle breeding in our country. *Lucrări Ştiinţifice, 13*(2), 311-318.

[8] Koshkoih, A. E., Pitchford, W. S., Kruk, Z. A., Morris, XC. A., Cullen, N. G., Crawford, A. M., & Bottema, C. D. K. (2005, September). *QTL for meat colour and pH in Bos taurus cattle,* Application of New Genetic Technologies to Animal Breeeding: Proceedings of the 16th Conference. Noosa Lakes, Queensland, Australia.

[9] Mahesh, B., & Prabhuswamy, M. (2010). Process variability reduction through statistical process control for quality improvement. *International Journal for Quality Research, 4*(3), 193-203.

[10] Petroman, C., Bălan, I., Petroman, I., Orboi, M. D., Băneş, A., Trifu, C., & Marin, D. (2009). National grading of quality of beef and veal carcasses in Romania according to "EUROP" system. *Journal of Food, Agriculture & Environment, 7*(3, 4).