ABSTRACT

The doctoral thesis named **„Reserches concerning the influence of fodders content in minerals on dairy cows production and health“**, elaborated by engineer Niculae Fleancu and coordinated by the university teacher doctor engineer Ioan Mircea Pop, from the University of Agricultural Sciences and Veterinary Medicine „Ion Ionescu de la Brad“ Iaşi, at the Faculty of Zootechny, is structurated in two parts with many chapters and subchapters.

The first part contains an ample bibliographical research concerning the importance of growing cattles at national or international level, the tendencies and strategies of dairy cows breeding, the situation of these animals feature structures and their dynamics from the past years to the future structures and their oves.

In the first part there were also studied the functions which microelements and macroelements have in animals bodies, their importance and influence in the dairy cows nourishment on their productions and health situations, their presentation and the motives that influence mineral substances assimilation in animals body.

The motives that contribute to the appearance of a shortage condition of animals were distinguished by analysing the nutritions level from the used fodder in dairy cows food, types of food including their physiological conditions, nutricious rations that had to be ensured, orientative portions, types and rules of nourishment, and also the influence of the spielding fodders conditions councerning the specific feature nurshing, having in view the influence of soil to the fodders composition, the influence of vegetation, plants composition and the relation fodder – productivity – health – animal.

Dairy rows exploatation can represent an important environmental factor of pollution was presented . there are minimal conditions which must be observed and avoid the environment contamination and the possibilities of storage, prevention and control of pollution for this category of animals.

The second part of this thesis includes the purpose of researches, the modality and the place where they were, materials and methods used in determinations, the final results and their interpretation and the conclusionsin in the end .

There were many stages of researches of researches which referred to the influence of the chemical composition of fodders used in the dairy cows food being in different physiological conditions of their health and the importance of administration some addition of different types of selenium to the animals from the observed farm, animals that seemed having a selnium storage.

In the first stage it was established the fodder ration for animals included in the observed farm, takeing account the physiological conditin, then some samples were taken from the fodders ad made chemical, mycological analyses.

Drawny consists in sin samples of volume fodders (as lucerne hay, maize silo, herds silo, barley grain and dregs) and two samples of concentred mixtures for dairy cows in the nineth months of pregnabcy. Separately some samples from the concentrates bad been drawing frm the respective mixtures (barley grain, maize grain , sun-flower groats and wheat, bran).

The current chemical analyses according to Weende's Scheme had been completed with determinations concerning in the content in Ca, P and Mg.

In tables 63, 65, 66, 67, 68 an 69 were introduced the results abtained and in figures 5-16 a graphycal representation of da obtained.

From data about chemical determinations of fodders it was found the fact that lucerne hay has high values of humidity which devolts uncertain condition od storage and a small content in mineral substans, and has also a high content of acetic and butiryc, a fact which could first of all lead to a state of ruminant acidosis, and, in the second case, to reducing the ingestion or to some digestive troubles, which is even more serious.

After toxicological determinations, it was found out that all kinds subject to analysis indicate a moderate contamination with yeasts and mycetes such as Mucor, Aspergillus, Absidia and Penicillium, and, from a mycotoxicological point of view, the samples were negative for alphatoxins (B1, B2, G1 and G2) and for ochratoxin A.

Regarding the concentrated fodders, it was found out these are also short in mineral substances, especially Ca, P and Mg, which could trigger some unbalances in the mineral metabolism: they have high content of fats and could trigger some hepatic troubles: a low content of gross protein, which could affect the reproduction activity, due to lacking some amino acids such as lysine, tryptophan, leucine and isoleucine, which are responsible for this activity; the deficiency in vitamin E and selenium, which may be associated with the apparition of some reproduction problems (follicular development, embryonal mortality, the interval between the whelping and first ovulation, the decrease in the intensity of the sexual behaviour during the fertile period, the repeated mating/inoculations etc.). Moreover, the deficiency of vitamin E and selenium may affect the immune system, by triggering some possible unbalances that may generate the oxidative stress, having the essential role in triggering degenerative diseases, due to the formation of free radicals.

It was continued by assaying blood samples in several stages (for performing the hematologic and biochemical examinations of the sanguine serum), fur samples, milk samples, for performing their chemical and biochemical examinations.

The assays for the blood samples were performed during winter, form cow groups with different physiological states (10 gestant cows, 10 recently calved, 10 cows with reproduction disorders), as well as during summer, but in this case, only one group was studied, made up of cows at the beginning of lactation. This was due to the state of the animals in this category as well as to those in advanced gestation, which was considered to coincide with the most intense metabolic solicitation of the body.

The range of assessed haematological parameters was: Haemoglobin (Hb), hematocrit (Ht), erythrocyte counting (E), leucocytes counting (Lc), leucoitary formulae.

The results concerning the haematological examinations performed were presented within the thesis depending upon the physiological state, in tables, counted from 70 to 73, and the graphical representation in figures 17 – 20.

Sequel to assessing the results obtained regarding the haematological exam, the following were found out: the parameters assessed in the blood samples have recorded values below the reference limits in most of the cases, regardless of the physiological state, which shows that, for those respective animals might, a nutritional anaemia might have been installed, due to an insufficient erythropoiesis, as well as because those animals indicate a deficiency in iron, copper, cobalt, folic acid and/or vitamins and proteins.

Also, the nutritional anaemia may be determined by deficiencies in the *heme* or *globin* synthesis, by decreasing the content of haemoglobin, due to consecutive lacking in iron, copper and/or albumins or as consequence of a blockage in the synthesis of some polypeptide chains of the globin.

With regard to the sanguine serum, this has resulted after the manifestation of the blood samples assayed from the same group of animals; the assessed biochemical parameters have been *the enzymatic profile*, where there were monitored the activities of the glutamic-oxaloacetic transaminase (TGO), glutamic pyruvic transminase (TGP), alkaline phosphatase (P-al), phosphokinase creatine (CPK), β carotene and the content of vitamin E and *the mineral profile*, within which the level of Ca, P, Mg, K, Se, Fe, Zn and Cu was monitored. Moreover, for the samples assayed from the cows lactating during the summer time, the level of proteins, albumin, urea, alkaline total cholesterol reserve was assessed.

After assessing the data obtained regarding the biochemical examinations (the enzymatic, vitamin and mineral profile) of the blood serum, it was found out that the activity of the glutamic-oxaloacetic transaminase, alkaline phosphatase and that of the phosphokinase creatine indicates increased values in most of the cases studied. Regarding the vitamin profile, it was found out that vitamin E as well as β carotene have recorded low values, which may indicate the fact the animals have a deficiency in tocopherols, which, combined with a deficiency in vitamin A for an elongated period of time, could generate serious problems onto the animals' health state, by losing their general immune function, but may affect the reproduction function (slight heats, delays in the ovulation, miscarriages, increase in the interval between calving etc.) and the mammary gland, by increasing the mastitis incidence, having an influence over the production.

The results obtained concerning the mineral profile have highlighted that the values of some minerals, such as Ca, P, Mg, Se have been low in some cases, in relation to the ones recommended by the literature, and in other cases, they were high, which could state disorders of the mineral metabolism, with major implications over the health state, by increasing the incidence of hypocalcaemia and hypercalcaemia, postpartum paraplegia, acidosis, hyper and hypomagnesemia etc. The selenium recorded low values in almost all cases, which could affect the natural immunity, by inefficient functioning of the phagocyte cells (neutrophils and macrophages) using free radicals as a weapon against the pathogens. Also, the low selenium values may have an effect over growing, reproduction function, food efficiency and integrity of the cellular membranes.

The biochemical assessments of the blood serum assayed during the summer time, from the group of cows lactating, have highlighted, for the protean and energetic profile, that all monitored parameters have recorded values close to the ones recommended by the literature, except for some cases where the differences were slightly outside the reference limits. Thusly, the albumin has indicated high values for almost half of the cases studied, indicating the existence of some possible inflammatory or infectious processes, as the high level of the globulins indicates the body's immune response. Also, the cholesterol has recorded important increases for most of the cases, and this may indicate that the energetic metabolism is modified, the body being subject to a state of overstrain and stress.

In order to better highlight the eventual deficiencies existing at animals' organism level, which are due to an alimentation with fodders lacking minerals, the assay and chemical assessment of some hair and milk samples were performed during the study, from the same category of animals, knowing that hair, by its chemical composition, may indicate the status of

the organism for a more elongated time period. The results obtained have also stated in this case that animals indicate certain deficiencies in minerals, which may cause disorders in the overall mineral metabolism. Thusly, it was found out that magnesium has recorded low values for all animal groups, which may determine the increase in the tetanies and in the existence of some disorders resorptions at the level of the small intestine, probably due to the excessive share of nitrogenous substances, K, Ca, sulphates, P, coopper has also recorded increased values, in this case, the hypochromic microcytic anaemia.

The laboratory chemical assessments of the milk samples have monitored the pH value, which may indicate the alkalinity or acidity level, as the case may be; the milk density which may indicated the level of the mineral salts; the presence of blood in milk, indicating the health state of the udder and its integrity. The data obtained have highlighted that in some cases the acidity is high, denoting that silo fodders used in the animals' food have a high content of acetic acid, thusly probably installing some acidosis states, and the presence of the blood traces in some samples may indicate the existence of some troubles at the level of the udder (mastitis), having an important role in the parturition syndrome. Regarding the chemical composition in the some minerals, it was found out that the Se level in milk has had low values, indicating hyposelenosis, nutritional disease, which may have repercussions over the reproduction function (infertility, placenta retentions etc.) and immune function. Recording a low level of Zn in the milk compositions may indicate disorders of the metabolism of proteins and lipids, influencing the food consumption and growth of the organism and possible effects over the DNA synthesis in the liver, skin and brain, but also of the epidermis, tongue, oral mucous, oesophagus and even of the stomach, determining the delayed healing of the cankers, difficulties in the parturition process etc.

In the second stage of the researches, the periodic morphoclinical examination and gynaecological were performed as custom means for diagnosis, monitoring the evolution of the animals' health state. Thusly, it was found out that within the farm taken into study, the cases of pododermititis, ruminant acidosis, ketosis, dispnea myopahty and parturition paresis had a sufficiently high incidence from a morphoclinical point of view, especially for cows with increased milk productions. The gynaecological investigation was performed over a five month period and monitored the performance of calving, of eliminating the placenta, the evolution of the endometritis, the troubles ante and postpartum, the interval between calving and first insemination, the gynaecological state at the time of the first surveillance, the chemical state of the calves after calving. The results concerning the gynaecological assessment were shown in tables 92-97.

Taking into account that during the study it was noted that the fodders used in the animals' alimentation as well as the assessments of the blood, milk, blood serum and hair assayed from them have indicated deficiencies of mineral nature, especially in selenium, with serious consequences over the health state, in the third stage of the research, deeming right to perform some additional assessments confirming that respective deficiency. As the additional assessments also confirmed that the deficiency of Se progresses on the farm, it was continued with adding various preparations based on Se, by various administration methods.

The first administration method was by injecting a preparation based on barium selenate (inorganic form) in single dose of 7.5mg weekly for 21 days, along with vitamin E (1500 UI), to a group of 8^{th} month gestant cows and heifers.

As the assessments of the blood, milk and hair, assayd from those respective animals and from calves resulted from them, at different time intervals since administrating the preparation, they have highlighted there are no significant differences regarding the content of selenium, in relation to the witness group, so this method was deemed as inefficient.

The second adding method was by orally administrating organic Se and vitamin E, by giving in food a premixture with bran or fodders combined in a dose of 25g/animal, to a group of 12 gestant cows and heifers, for a time period of eight months. From the results obtained with regard to the samples of blood, serum, milk and hair, assayed in 1, 2, 4, 7 and 8 months from starting the study, it was found out that selenium slowly but progressively accumulated into the animals' organism of the experimental group, compared to the witness group and in two months from interrupting the premixture administration, the Se values were double compared to the experimental group. Concomitantly, the glutation-peroxidasis activity was determined from the blood samples, in one month time from terminating the administration of the premixture, noting that it is significantly more intense than for the witness group, which proves the accumulation of some Se deposits in the organism by homeostatic means, out of which this mobilises a minimum necessary for performing the complex functions of this mineral.

The presentation of the static processing and the interpretation of the date may be found in tab. 98 - 114, and their diagram is in fig. 43, 44, 45 şi 46.

The conclusions and recommendations are shown on page 238 – 245.