ABSTRACT

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Key words: boars, sows, reproduction indicies, nutritioon

One of the main factors that may influence the processes of reproduction refers to the nutrition. The nutrition of the pigs must be both qualitatively and quantitatively, also specifically conceived for categories of age, sex and physiological state. In boar, the nutritional value is reflected in spermogram indices, and in sow, this is reflected in fertility and fecundity processes.

It is widely accepted that nutritional management is the main limiting factor of the reproductive function in domestic animals. A continuous improvement in breeding performance can also be achieved through a proper quantitative and qualitative diet. Nutrition is the most important external factor with the biggest influence on the reproductive function in animals, generally, and in pigs, specially.

The present paper entitled**:** ***RESEARCHES REGARDING NUTRITIONAL SUPERVISION IN SWINE BREEDING PROCESSES*** is worded after the norms in force, and contains two major parts:*Morphology of genital apparatus in boar; Morphophysiology of genital apparatus in sow; Nutritional factors influencing reproductive processes in swine; Reproduction biotechnologies in boar; Reproduction biotechnologies in sow*.

Part II is made up of our own research and contains five chapters entitled:Care and exploitation conditions of swine; Evaluation of sperm production in reproductive intensive care system with a standard nourishment; Opportunities for the improvement of the fertility using heterospermic semen and nutritional supplements; Indices of breeding in sow depending on the type and mode of administration of the rations; Use of hormonal treatments in grouping oestrus in pigs; Synchronization of oestrus in gilts using RegumateSuisses product

Research related to this thesis were carried out in two farms of growth and exploitation of pigs, the growth system in both farms being a closed one, integrated, and having their own breeding farm.A farm is located in the North-Est of Romania and the other in the North-West of Italy. In both farms research work was carried out for more than 6 years.

In **chapter I**, based on literature, it is described the ***MORPHOPHISIOLOGY OF THE GENITAL APPARATUS IN BOAR,*** with the anatomic particularities of the genital apparatus, from testis to penis, as well as the physiology of the boar genital apparatus, with the description of the spermatogenesis and the neuroendocrine regulation of the reproductive function. The following are aspects of seminal cell morphology and sexual reflexes in boar.

In **chapter II**, the ***MORPHOPHISIOLOGY OF THE GENITAL APPARATUS IN SOW***is presented. This chapter treats subjects that are known in the special literature, on the gonads and genital tracts of the sow, aspects of oogenesis and folliculogenesis, as well as sexual cycle in pigs. The chapter also deals with aspects of endocrinology in reproduction and regulation of this function.

In **Chapter III**, a larger chapter, are presented in detail ***NUTRITIONAL FACTORS INFLUENCING THE SWINE REPRODUCTION PROCESSES.*** The data refer to the particularities of the digestion in pigs, speak about nutrition notions related to age and sex categoriesin swine. Also, new data regarding pigsfood requirements (energy, protein, minerals and vitamins) is presented. In the last part of the chapter, aspects of the influence of the nutrition on the reproductive function are also mentioned (such as deficiencies, over and under nutrition).

In **chapter IV**, new ***REPRODUCTION BIOTECHNOLOGIES IN BOAR***are presented. The improvement of the breeding performances in boars and sows are based on the genital function’s particularities as well as on the complex of factors that determines it.Improving operating conditions along with the presence of hybrids of different age and physiological state can prevent or correct the numerous dysfunctions or some reproduction parameters. It is known the fact that the biotechnology of artificial insemination is a new and promising method in the modern zootechnics, a method that allows the intensification of animal breeding and production.Currently multiple methods and techniques of semen collection are used: harvesting sperm using artificial vagina, manual harvesting and harvesting with the electroejaculator.Evaluation of the quality of semen is made by preparing complete and correct spermogram for each boar.To assess the fertility of breeder, semen quality control is an essential factor.Fecundity of a male depends on the quantity and quality of the sperm.

Chapter V describes the current ***REPRODUCTION BIOTECHNOLOGIES IN SOWS.***Artificial inseminations (A.I.) represent an alternative of the intensification of breeding in pigs, the effects are reflected by fertility percentages and the classic advantages they offer. The first subchapter speaks about the biotechnology of detecting sows in estrus. The sow is a polyoestric animal, with sexual cycles that succeed all year. Sows manifest very good the oestral faze, and thus the detectionis relatively easy as well as the schedule for insemination.Behavioral studies have established that immobility reflex is accompanied by particular piglet squealing of sows (acoustical sign), olfactory signs (due to pheromones), optical signs (given by the visualization of the boar), taste issues (anorexia of varying degrees) and tactile aspects.Since the sow heat lasts 2-4 days and the releasing of eggs takes place successively after about 16-18 hours of the onset of heat (even 24-35 hours), artificial insemination should be performed the day after oestrus detection, and if possible, repeated at 8-20 hours. The insemination is done using morphostructuraly appropriate devices for the particularities of the genital apparatus of the sow (classic and intrauterine).

The purpose and objectives of this thesis are: Nutritional monitoring of boars and sows in intensively exploitation pig farms in terms of nutrition-reproduction-production relationship; Evaluation of boar sperm production in intensive care systems with a standard nutrition; Improving sow's fertility, by using on A.I. a heterospermic semen and by using nutritive supplements; The evaluation of the reproduction indices in sows depending on the type of feed and the mode of administration of it; The opportunities to stimulate oestrus in sows using **PG 600** product and the synchronization of the estrus in gilts with **Regumatesuis** product.

In **chapter VI**, there are described the ***CARE AND EXPLOITATION CONDITIONS OF SWINE***. In this chapter the unities and the conditions of research are presented. The company SUINPROD S. A. Roman is structured so: farm of hybridization; commercial complex; station of compound feed production; mechanical sector; area of investment; the sector of gardens; administrative sector. The Frateli PINTA farms are intensive care units for pigs, located in the Cuneo (Centallo), in the northwest of Italy, about 60 km from the Alps and at the border of France.Both farms have over 2500 pigs and comply with all the conditions of maintenance and nourishment required by EC regulations.In both farms are developed assisted monitoring protocols for the reproductive function, coupled with nutrition surveillance. The genetic value of

pigs is higher in both farms.Feeding is semi-automatic, with its own charging system with nodes. Farms have their own FNC and agricultural land required for cultivation and the production of cereals.Feed formulations are done by specialists in their own feed kitchens. The swine farm in which the research was conducted are modern and have adequate technology to exploit both sows and boars.Boars are accommodated in special speakers providing individual comfort. Young boars are trained in harvesting semen from the age of seven months when they start getting used to controller, harvest room and the mannequin.Sows and gilts are housed and maintained according to their physiological state (lactation, gestation and waiting). The nutrition of boars was made after rigorous plan of operation prepared monthly for each boar (with rest days between harvests), and qualitative and quantitative rations are balanced according to age. The harvesting method was the one using double glove. To ensure growth indicators and required physiological state, feeds used in breeding boars diets should contain at kg: 3000 kcal metabolizable energy, 15% P: B: the S: U: ration, 11.3 g lysine, methionine + cysteine 7.3 g, 14 g calcium 8 g phosphorus, 2.8 g sodium, 20 000 U: I: vitamin A, 30 vitamin E.

In **chapter VII,** it is described the***EVALUATION OF SPERM PRODUCTION IN REPRODUCTIVE INTENSIVE CARE SYSTEM WITH A STANDARD NOURISHMENT.*** The research was organized for 12 months (2007-2008), in a zootechnical complex of growth and exploitation of pigs, in NE area of Romania, where all biotechnical and technological parameters were respected. The nutrition of boars in this study was made with standard feed with single feed grain, protein, mineral and vitamin energy value requirements fall within the rules.Sperm quality indexes is determined immediately after harvest, and in its appreciation a series of general and special laboratory assays are made. The required analyzes parameters in production farms are: volume, color, presence or absence of spermatozoa, sperm concentration, degree of agglutination and mobility. The primary role of the sperm is the ability to fertilize, which is closely correlated with sperm mobility. The average volume with the highest value was 431,6 ml, and was registered to a PIC line boar, aged 3,1 years, followed by the PIC boar 1,5 years with 413 ml.Similar values were obtained in Pietrain race of six years, where the average volume was 368,5 ml.Sperm concentration was inversely proportional to the volume of ejaculate.The 3.1 yearsold hybrid PIC boar’s ejaculate volume recorded the highest value and the lowest concentration. Instead, the Large White boar, with the highest sperm concentration (0,403 x109 spz/ ml) the value of recorded volume was framed in the media group of examined

boars (327 ml). The annual average of ejaculate on sperm production, under standard nutrition, is in the number of doses prepared for preservation and / or insemination.The average number of doses obtained from processing ejaculate in our study was 39.

Chapter VIII, speaks about ***OPPORTUNITIES FOR THE IMPROVEMENT OF THE FERTILITY USING HETEROSPERMIC SEMEN AND NUTRITIONAL SUPPLEMENTS.*** This experiment was conducted in a pig farm situated in the NE of Moldavia, and was extended for a period of 2 years. The biological material studied was represented by two hybrid PIC boars and females in the batch jelly (sows and gilts). The nourishment of boars and sows was performed with single feed administered twice daily after the farm own recipe. In the second part of the experiment, to stimulate growth indices of breeding, nutrition was supplemented with vitamin-mineral premix Aminov Breeder Pig Premix.Under standard diet, on separate categories, the boar 1, obtained a mean fecundity, by homeospermic A.I. 87,0%, and in the boar 2 the mean fecundity for artificially inseminated sows with homeospermic material, was 86,0%. By practicing heterospermic insemination (with semen from two boars), and supplementing the ration with Aminov Breeding Pig Premix, improvement of fertility and prolificacy was obtained as follows: average fecundity of females in the experimental group was 2,9% higher than that of females in the control group; the average number of piglets produced/calving in sows in the experimental group was 11,5, 0,21 higher than the average number obtained in sows in control groups; the prolificacy of gilts in the experimental group was 10, 33 piglets, up to 0,1 piglets compared to that obtained in group LM. Given the fact that the heterospermic insemination does not need no additional spending compared to the homeospermic one, even if the effect of improving the fertility and proficacy is low, this action is justified.

In **chapeter IX**, the results regarding the***INDICES OF BREEDING IN SOW DEPENDING ON THE TYPE AND MODE OF ADMINISTRATION OF THE RATIONS***are presented. The research was conducted in a swine farm in the NW of Italy. To remove the best possible the other factors that can influence the reproductive activity, we have studied two homogenous groups of sows that have been studied for 12 months,the same races, close ages, housed and maintained in the same conditions in the farm. The difference between the two groups was the type, the way of administering the ration and the composition of it. If in the group 1 the nutrition was represented by standard single feed administration, nutrition in group 2 was

differentiated by age and physiological state (rations diversified for gilts, sows in waiting, gestating sows, lactating sows). Highest fecundity (90%) was found in group L2, and in L1 the fecundity was 88,2%; note that the group who applied a diversified nutrition category (L2), fertility rate increased by 1.8%.Calving rate calculated from the two experimental groups was 78,14% in L1compared to group L2, where there was a higher value to those who have farrowed (80,44%).Total number of piglets obtained the entire period of the experiment was to L1 of 43,720 pigs and 49,552 piglets in group L2. The weaning of piglets after lactation was of 38703 in L1 and 45224 in L2. On average, the mean prolificacy per year was of 28,04/calving in L1 and 30,35/calving on L2, and the average of weaned piglets/calving was 24,83 in L1 and 27,7 in L2.

In **chapter X,** the results obtained after the ***USE OF HORMONAL TREATMENTS IN GROUPING OESTRUS IN PIGS***are presented. The main objective was to use two types of therapies in terms of stimulation and synchronization of oestrus in pigs.

STIMULATION OF OESTRUS IN SOWS BY USING THE PG-600 PRODUCT. The experiment was conducted during the years 2007 - 2008 at a pig farm pig in the N - E of Romania. 144 sows were studied after weaning, and were examined daily (for 30 days) to detect heat and determinate the optimal time of insemination.Of all sows there were organized two homogenous groups: control group (LM) and experimental group (LE) composed of 72 sows each. Sows in LE received in the 5^{th} day p.p. 500 ml PG600 each for resuming oestrus.The onset of oestrus in the control group (LM) was 87,5% who experienced spontaneous estrus and in the LE, induced oestrus was 95, 8%.We observe a marked increase in the percentage of sows going into heat, the group treated with PG 600, which is a + 8,3% compared to the control group. The grouping of oestrus in sows was highlighted in the first 10 days in the control group and in the first 5 days in the experimental group.In the control group, 76,4% of sows had spontaneous estrus after weaning, and in the experimental group (sows in anoestrus), heats were induced in 75% of them.Fecundity recorded in sows in the control group (LM) was 85,7%, while in the experimental group (LE) was 92,8%, which is 7,1% higher.The effect of treatment with PG 600 product resulted in increasing the prolificacy, thereby providing an additional 0,46 piglets weaned / sow. If we sum up these results with the increasing of fertility by 7,1%, recovering sows that did not show estrus within 5 days after weaning and the group heats and births, we

believe that this protocol has favorable results and is useful for directing and improving function by breeding in a pig complex.

SINCRONISATION OF OESTRUS IN SOWS BY USING THE *REGUMATE SUISIS* PRODUCT. This experiment was conducted in a farm in the N of Italy. The indice of the used sows represents the number of litters achieved on average for a sow per year, this value bringing with it the value of economic efficiency in swine production.The purpose of this study is to organize and maximize the exploitation circuit for breeding of the pigs in terms of onset of oestrus, synchronization of the oestrus and the use of sows in reproduction in a continuous and controlled way toachieve the highest rate of use.Following the administration of treatment with hormonal product RegumSuisto synchronize estrus in gilts, the estrus was manifested at a rate of 100%. Depending on the time of onset of oestrus, it was noticed that 4,1 % of gilts that have entered the heats in the 3^{rd} day after the end of the treatment, 41,7% entered oestrus in the 4^{th} day, 50% entered in heats starting with the 5^{th} day, and only 4,1% started on the 6^{th} day.The manifestation of oestrus in gilts treated with Regum, has a peak onset clustered between the $4^{th}$and 5^{th} day, where over 90% of females (91,7%) were found in estrus. Thefecundity in the 25^{th}day of the gilts synchronized with RegumSuis, was 95,83% and the rate of the total farrowing lot introduced to hormonal therapy was 95,83% . Expressing in percentage the prolificacy of the different categories of piglets obtained: 14,69 piglets / calving, 91,02% were represented by live piglets, 5,85% were dead piglets and 3,19% mummified.

This thesis concludes with some general conclusions, which essentially reflects its contribution in the field of breeding pigs and opportunities to improve reproduction indices of breeding boars and sows, using an adequate nutrition.