

## POSTER PRESENTATIONS

### THE IMPACT OF MICROCLIMATE FACTORS TO PIGS' HEALTH AND PERFORMANCE

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#### SUMMARY

The scope of this work is to study how the environment can influence the pigs' health and performance.

The study was realized in a pig-farm from Bumbești-Jiu locality, Gorj County, Romania. The parameters as the concentration of CO<sub>2</sub>, NH<sub>3</sub> and H<sub>2</sub>S and intensity of noise were determined in the following compartments: nursery, young pigs, fattening, using gas-analyzer and sound meter. The determination were made in two moments: first – when in compartment there was only natural ventilation, the second – after introducing of automatic ventilation. In parallel with environmental parameters, there were analyzed the health parameters (morbidity and mortality) and the performance parameters (daily average weight increase and fodder consumption per weight increase).

After introducing of automatic ventilation, it was observed the followings:

- improving of concentration of CO<sub>2</sub>, NH<sub>3</sub> and H<sub>2</sub>S;
- decreasing of morbidity with 20–30%;
- decreasing of mortality with 6%;
- increasing of daily average weight increase with 100g per day for young pigs and 130 g per day for fat pigs;
- decreasing of fodder consumption per weight increase with 0,2–0,3 units for young pigs and 0,9 units for fat pigs

**Keywords:** performance, health, environmental, animal welfare

#### INTRODUCTION

In Romania, the same as all over the world, there is a major concern of the breeders, together with the veterinarians, to ensure the welfare of the animals. One of the acknowledged criteria by which the animal welfare is ensured is also the creation of a comfortable area for the animal, together with its physical security (the absence of discomfort). An essential requirement for the animals' health is to provide the microclimate factors in normal parameters – this means to eliminate the ecological stress non-animated factors (high concentrations of CO<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>S, noise).

As a short term strategy, the pig breeders decided to evaluate the state of welfare by indirect methods regarding the “*interrogation*” of the animals, the studies being also required by the

practical farm conditions where the unjustified decrease of productive performance, increased morbidity and mortality are observed. Following the epidemiological investigations, it was established that the determination of the microclimate factors would be one of the priorities.

### Material and methods

A team of veterinarians and assistants went in the morning in Gorj county at the pig farm Bumbęsti Jiu, before starting the daily activities (airing by opening the windows, cleaning, feeding...etc.). The concentrations of the gas emissions and the intensity of the sounds were determined with the help of the gas analyzer and sound meter, (CO<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>S), in various points from the shelter at various heights, especially in the compartments in which the morbid processes were more dramatic, namely in the maternity, youth and fattening room.

The determinations have been performed in two different conditions:

- the first, in conditions of natural ventilation;
- the second, after a month, in conditions of automated ventilation

The health parameters (morbidity and mortality) and the performance parameters (the average gain in weight and the specific consumption for kilogram of weight) have been analyzed in parallel.

Also, together with these determinations necropsy exams were conducted on the animals found dead.

## RESULTS AND DISCUSSIONS

**Table 1.** Values of the microclimate factors in conditions of natural ventilation

No.	Name of objective	Specification	CO <sub>2</sub> (%)	H <sub>2</sub> S (ppm)	NH <sub>3</sub> (ppm)	Noise intensity (dB)
1	Shed 3 Compartment 2	Entrance to shelter	0,3	7	6	50,24
	Maternity	At animal level	0,3	8	8	–
2	Shed 4 Compartment 3	Entrance to shelter	<b>0,5</b>	6	6	70,2
	Maternity	At animal level	<b>0,5</b>	7	10	–
3	Shed 6 Compartment 1	Entrance to shelter	0,3	5	3	73
	Hatchery phase I	At animal level	<b>0,4</b>	9	2	–
4	Shed 5 Compartment 1	Entrance to shelter	0,3	4	8	77,4
	Maternity	At animal level	0,3	7	11	–
5	Shed 7 Compartment 3	Entrance to shelter	0,3	6	20	58,5
	Youth	At animal level	<b>0,4</b>	<b>15</b>	<b>30</b>	–
6	Shed 8 Compartment 3	Entrance to shelter	0,3	4	5	58,2
	Youth second phase	At animal level	0,3	7	7	–
7	Shed 14 Compartment 1	Entrance to shelter	0	6	7	53,8
	Youth 90 days	At animal level	0	8	7	–

**Table 1.** Continuation

No.	Name of objective	Specification	CO <sub>2</sub> (%)	H <sub>2</sub> S (ppm)	NH <sub>3</sub> (ppm)	Noise intensity (dB)
8	Shed 11 Compartment 4	Entrance to shelter	0	17	27	75,3
	Youth 150 days	In the middle of the shelter	0	24	31	–
		At animal level	0,2	33	44	–
9	Shed 11 Compartment 3	Entrance to shelter	0,2	45	53	64,6
	Youth 130 days	Middle of the shelter	0,2	37	49	70,3
10	Shed 15 Compartment 1	Entrance to shelter	0	8	17	–
	Fattening room	Middle of the shelter	0	9	21	75,24
		At animal level	0	7	20	–
11	Shed 8 Compartment 1	Entrance to shelter	0	5	0	55,4
	Gestation	At animal level	0	9	0	–

The maximum allowed gas concentrations and noise intensity inside the shelter which are stipulated by Romanian veterinarian-sanitarian law, for all the porcine categories raised in the intensive system are as following:

- 0, 3% (3000 ppm) for carbon dioxide (CO<sub>2</sub>);
- 26 ppm for ammonia (NH<sub>3</sub>);
- 10 ppm for hydrogen sulphide (H<sub>2</sub>S);
- 80–90 dB for noise intensity

According to the data analysis, the maximum allowed concentrations have been surpassed for ammonia, carbon dioxide and hydrogen sulphide in the compartments marked in the table; the noise intensity was registered in normal limits.

It is known from the specific literature that all the three investigated gases are involved in the outcome of the morbid processes, becoming toxic for the nervous system, breathing system, blood and mucous membranes when they are in high quantities.

The result of the combination with the cellular enzymes is the cellular anoxia, manifested through a state of agitation, convulsions, cyanosis, digestive upset, all these cumulated leading to an increase in morbidity and mortality percentage which, at that moment, rose to 30–40% and 14% respectively.

After the anatomy pathologic examination, the following table distinguished:

- oedema and pulmonary haemorrhage;
- hepatic – renal congestion,
- fluid and light coloured blood (raspberry colour);
- degenerative lesions of the nerves;
- brain and meninx haemorrhage;
- hepatomegaly in 1% of the examined cases

As a result of this action, the farm's management decided to improve the microclimate conditions by installing automated, high-performance ventilators, specific for the porcine breeding sector.

The protocol that determines the microclimate parameters has been repeated a month after these ventilators had been installed, noting primarily an improvement of the productive performances of the animals, expressed by:

- improvement of the specific consumption from:

- 2.4–2.5 kg forage/kg gain to 2.2 kg forage/kg gain in the youth category;
  - 3.6 kg forage/kg gain to 2.7 kg forage/kg gain in the fat porcine category
- increase in the average weight gain:
- from 400 g/day to 500 g/day in the youth category;
  - from 670 g/day to 800 g/day in the fat porcine category

The morbidity and mortality percentage have decreased to 10% and 8% respectively. The repetition of the determinations regarding the three target noxious gases proved that all the obtained values were below the normal limits allowed by the legislation in force.

## CONCLUSIONS

- the welfare of the farm animals has been a major subject of concern for the breeders and for the general public for a few years;
- there is a also necessity to develop some measurement systems for the welfare of the farm animals, on a scientific basis, to answer among others to the certification demands coming from the farms;
- the selection of the measures for an evaluation system must be based on validity, repeatability and feasibility;
- the improvement of the ventilation system brought an improvement in the health and performance parameters of the animals;
- the evaluation of the animal welfare must be performed on zoo cultural, behavioral and physiological criteria, keeping in mind that the optimum environment for the animal should ultimately answer to the productivity criteria, which will ensure an acceptable way of life for the breeder.

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