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HYGIENIC AND SANITARY CONDITIONS OF THE GOAT FARM VERSUS SOME HEALTH PARAMETERS OF GOATS*

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Abstract

The aim of the present study was to evaluate hygienic conditions in a goat house with regard to selected health parameters of goats and external air contamination around the goat farm. The study was carried out in three seasons (winter, spring and summer) on a goat farm with 600 foundation females. The analysis included basic microclimatic parameters, measurements of ozone concentrations inside and outside the building, microbiological analysis of air inside and outside the building, analysis of milk for somatic cell count, and basic blood analyses. The building showed a good hygienic potential with regard to most microclimatic (except thermal) parameters and poor sanitary standards, as evidenced by the presence of potentially pathogenic staphylococci in the air. Milk somatic cell count exceeded permissible standards and revealed subclinical udder infections. Blood tests showed malnutrition or diseases of animals, especially in the spring period. It is worth noting that despite the increasing consumption of goat milk and goat milk products, no detailed standards have been determined for them.

Key words: microclimate, goats, blood, milk, environment

Animal breeding exhibits different trends in production types, breeding systems and animal species. These depend mainly on the economic situation and profitability, sometimes also on fashion. Probably all of these factors have contributed to a grow-

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ing interest of breeders in goats (*Capra aegagrus f. hircus* L., 1758), which proved themselves to be highly beneficial, inquisitive and nice animals.

Goats have become widespread thanks to their modest nutritional requirements, ability to find food and high resistance to climatic conditions. They are found on all continents as they adapted themselves to various environmental conditions (Devendra and McLeroy, 1982). Until recently, goats were referred to as the “poor man’s cow” and symbolized the country’s economic backwardness. Today there are two models of goat keeping: in backyards where they serve as ornamental animals and in large herds where they are kept for tangible economic results, providing luxury goods of high quality (Dubeuf et al., 2004; Haenlein, 2007). For these reasons, the goat population is growing, especially in wealthier countries (Coop, 1982). The increasing interest in goat breeding has also been observed in Poland since the 1990s (Balicka-Ramisz, 1999).

Milk is the basic product obtained from goats. The high nutritive value of goat milk is due to the fact that it is easily assimilated by the human body, as determined by the specific nature of fat globules (much smaller in goat milk than in cow milk), low cholesterol content and trace amounts of the α-S1 casein fraction of protein. This contributes to the domination of albumins and globulins that cause no allergic reactions (Anifantakis and Kandarakis, 1980). In addition to milk, goats provide valuable meat that is very lean and low in cholesterol, as well as skins that are used to produce luxury products such as wallets, handbags, gloves, jackets, coats and shoes.

To obtain products of high quality, animals should be provided with appropriate microclimatic conditions that affect not only the comfort but also the productivity of animals. In their efforts to maximize the economic results, breeders often forget that modern production is a threat to animal health and welfare. The concept of welfare or well-being is inconsistent and given different definitions (Kołacz, 2000). According to Hughes and Duncan (1988), it is a state of physical and psychological harmony between animals and their surroundings. A well-treated and properly cared goat will repay breeders with a friendly disposition and high-quality products that determine the economic results of breeding (Steppa, 1996). Poor microclimatic conditions in goat houses can be responsible for as much as 20% feed losses. Livestock buildings should protect animals from the unfavourable effects of the external environment while limiting the negative effects of animal breeding on the surroundings (Erasmus, 2000). The ever increasing intensification of animal production, which involves a large concentration of animals in a small area, poses a threat to humans and the environment. The surroundings of commercial animal farms are threatened with the contamination of water, soil and air by chemical and biological factors (Kluczek, 1999). The contamination of air by chemical substances (e.g. nitrogen compounds, sulphur compounds or carbon dioxide) can be indirectly determined by measuring the concentration of ozone in the air (Pawlak, 1995). The biological contamination of air primarily means the contamination with viruses, bacteria, fungi and pollens. This contamination of air occurs in the form of biological aerosols and can contribute to the incidence of allergies, contagious diseases and epidemics (Marcinkowska, 2002).

The aim of the present study was to evaluate the effect of hygienic conditions in a goat house on the health parameters of goats and contamination of the outer environment.

Material and methods

Experimental facility

The study was carried out in the winter, summer and spring season on a goat farm located in the Śląsk province, within the Kraków-Częstochowa Jura. The farm area is leased from the Agency for Restructuring and Modernization of Agriculture. The area of agricultural land is 160 ha, of which 24 ha are arable land and 136 ha are grasslands. The experimental goat house is one of the largest in south-eastern Poland. The commercial herd has approx. 600 foundation females of the White Improved and Fawn Improved breeds. The goat house was converted from a sheep house. It is 80 m long by 18 m wide and 5 m high, and has a usable area of 1440 m^2. The window to floor area ratio is 1:16.6. Building ventilation is provided by 6 gravitational ducts located in the roof.

The building has its own milking parlour and dairy room. Goats are milked twice a day in 40 milking stalls. Group deep-litter pens are used. In the summer goats are fed pasture forage, hay, straw and concentrates, which are given twice daily during milking. In the winter, goats receive beets in addition to concentrates and hay.

Research procedures

The analysis included the evaluation of basic microclimatic parameters inside and outside the goat house; microbiological analysis of air; basic physiological parameters of blood; and milk analysis for somatic cell count.

The following **microclimatic parameters** were evaluated: air temperature and humidity (Assmann aspiration psychrometer); air cooling and velocity (Hill's dry katathermometer); concentrations of ammonia, hydrogen sulphide and carbon dioxide (POLYTECTOR II electronic meter); and room brightness (light meter model TES 1335). Percentage coefficient of brightness was calculated from the results obtained. The measurements of microclimatic parameters in the goat house were performed at the same three points located in different areas of the building. External microclimatic measurements were taken 10 m away from the building.

To determine the degree of air degradation by animal odours, **measurements of ozone concentration** were performed using a single-gas electronic meter type DP-11 OZ. Ozonometric measurements were performed inside and outside the building (20 and 50 m away) in a wind-flow direction.

Air samples for **microbiological analyses** were taken in the goat house, milking parlour and outside the building. External air was collected in the plume at three points: next to the entrance door; 5 m from the building; and 25 m from the goat house in a wind-flow direction. Air samples were taken with a Merck MAS 100 impactor air sampler, in which the air stream which contains microorganisms is directed onto the surface of microbiological culture. In the microbiological tests, the cultures used were general-purpose medium for bacteria (MPA), selective Chapman agar for staphylococci (Ch M^+ – mannitol-positive and Ch M^- – mannitol-negative), Pochon agar for actinomycetes, and general-purpose (wort) medium for fungi. After appropriate incubation time, the number of grown colonies was converted into colony-forming units (cfu) (both spores and mycelium parts for fungi, and vegetative cells and spores for bacteria) per m^3 of air according to the formula provided by the air sampler manufacturer.

Blood for physiological analyses was taken from the external jugular vein from 12 randomly chosen goats. A total of 2 ml blood was taken from each goat into $EDTAK_2$ tubes and subjected to basic physiological analyses. The blood samples were analysed for the levels of haemoglobin, haematocrit, leukocyte and erythrocyte count, and white blood picture. Blood analyses were performed at the Veterinary Analytical Laboratory in Kraków.

To evaluate udder health, 150 ml of milk was drawn from each of the same group of goats to determine somatic cell count. The analyses were performed at the Milk Testing Laboratory of the National Animal Breeding Centre in Opole.

Results

Microclimatic parameters and results of blood and microbiological analyses are given in Tables 1–3.

Table 1. Mean values of microclimatic factors in different stages of investigations

Place of measurement	Time	Temperature (°C)	Relative humidity (%)	Air flow (ms^{-1})	Cooling power ($mWcm^{-2}$)	NH_3 (ppm)	CO_2 (ppm)
Goat house	Winter	10.2	80	0.17	41	4	2283
	Spring	14.4	73	0.10	33.7	6	3000
	Summer	21.8	60	0.13	22.5	8	500
Outside	Winter	-1.8	96	3.49	170		300
	Spring	3.2	81	0.45	70.6		300
	Summer	23.2	38	2.89	55.8		350

The measurements also showed that mean ozone concentrations inside the building ranged from 25 to 29 ppb. Ozone concentration 20 m from the building ranged from 28 ppb in the spring to 37 ppb in the summer. Fifty m away from the goat house, ozone concentration in the plume ranged from 39 ppb in the spring to 75 ppb in the summer.

In the winter period, somatic cell count in goat milk ranged from 86 × 10^3/ml to 5118 × 10^3/ml (1442.2 × 10^3/ml on average) per ml of milk. It ranged from 159 × 10^3 to 6143 × 10^3/ml (1548.3 × 10^3/ml on average) in the spring, and from 408 × 10^3 to 19 776/ × 10^3ml (3621.5 × 10^3/ml on average) in the summer.

Table 2. Amount of microorganisms in air (cfu m^{-3})

Place of measurement	Time of measurement	Total bacteria	Actino-mycetes	*Staphylococci sp.* ChM^{-}	*Staphylococci sp.* ChM^{+}	Fungi
Goat house	Winter	5530	267	49 875	0	65 863
	Spring	31 600	8900	5500	56 600	5500
	Summer	267 133	3400	333 333	0	8000
Milking parlour	Winter	1228	22	25 111	0	38 242
	Spring	32 000	6700	3200	41 600	4800
	Summer	315 333	2933	297 333	0	12 733
Entrance door	Winter	11	0	11	0	6
	Spring	53	7	67	0	60
	Summer	30 667	233	160	0	160
5 m from goat house	Winter	28	0	28	0	39
	Spring	40	33	13	113	87
	Summer	67	0	27	0	267
25 m from goat house	Winter	50	0	106	0	28
	Spring	13	0	33	127	67
	Summer	67	0	33	0	193

Table 3. Mean value ±SD of circular blood parameters in goats

Time of measurement	Erythrocytes (10^6/mm^3)	Leukocytes (10^3/mm^3)	Haemo-globin (g/dl)	Haema-tocrit (%)	Lympho-cytes (%)	Neutro-phils (%)	Eosino-phils (%)
Winter	5.59±1.485	14.02±3.59	8.4±3.10	20.7±6.1	57.0±10.4	40±9.4	4±3.2
Spring	2.78±0.797	10.33±2.25	8.9±3.21	32.5±4.2	60.3±11.1	38±10.1	2±1.1
Summer	8.84±1.025	13.55±4.23	8.2±1.15	33±2.1	67.8±8.2	26±7.6	6±4.7

Discussion

Under Polish climatic conditions, breeding animals (including goats) spend most of their lives in buildings, which is why housing conditions are of great importance to them. The best facilities for goat breeding are specially constructed goat houses that meet all the requirements of goats in terms of livestock building design and hygiene. Often, however, goats are bred in converted farm buildings. Because livestock buildings are the most important element protecting animals against unfavourable conditions of the external environment, it is required that goat facilities be dry, bright, clean and well ventilated. They should also be safeguarded against the effects of heat and cold weather (Toussaint, 1997).

Thermal conditions of the breeding environment can be thoroughly evaluated based on the cooling power of air, which includes factors such as temperature, humidity, air motion and radiation (Toussaint, 1997). It was found that for farm animals this parameter should range from 27 to 38 mW/cm^2. The lower limit of this range is recommended for young animals, and the upper limit for adult animals.

Cooling power in the winter period averaged 41 mW/cm^2 and slightly exceeded the upper limit of the standard (Table 1). Greater cooling power results in excessive removal of heat from the animal's body. In the short term, it activates thermogenesis processes, and in the long term, it causes many diseases (especially respiratory diseases, udder inflammation, joint diseases) and reduces performance. In the summer period, cooling power averaged 22 mW/cm^2 and was slightly lower than recommended (Table 1). When too low, cooling power can cause hyperthermia in animals, leading to different diseases and lower productivity (Toussaint, 1997).

Temperature is one of the factors (not the only factor as some breeders believe) affecting thermal conditions in a livestock building. According to the regulation of the Minister of Agriculture and Rural Development of 2 September 2003 concerning the minimal housing conditions for different species of farm animals (Dz.U., 2003), air temperature in a goat house should be at least 8°C, but the optimum range is 10–18°C (Toussaint, 1997).

In the goat house studied, temperature did not fall below the lower standard limit (Table 1), but it should be noted that in the analysed period external temperatures were very high for wintertime (–1.8°C). In the summer, temperature slightly exceeded the standard when temperature outside the building was relatively low for summer (23.2°C). The measurements made allow conclusions on the thermal characteristics of the analysed goat house. With good insulation parameters, the building should maintain a constant temperature regardless of the external conditions. The measurements revealed low thermal autonomy of the building, which was particularly noticeable in the summer period. This raises a question about temperatures inside the goat house on colder days when outside temperature falls to below –15°C or in hot summer when temperatures reach +35°C. The other analysed microclimatic parameters affecting cooling power (relative humidity of air and air motion) (Table 1) were within the standards for goat houses in all the seasons investigated (Dz.U., 2003; Toussaint, 1997).

Goats require high light levels and daily light expressed by the ratio of window to floor area should range from 1:12 to 1:15 (Myczko, 1996) or even 1:20 (Toussaint, 1997). In the goat house studied, the ratio was 1:16.6, which seemed to be adequate because another indicator used to evaluate natural light in livestock buildings – the percentage coefficient of brightness (also known as the room lighting indicator), ranged from 1.55% to 23.4% and was considerably higher than 1% value, which is regarded as minimal (Kołacz and Dobrzański, 2006)

A comprehensive evaluation of livestock building microclimate should also account for the presence of harmful gas components, the most important of which are carbon dioxide, ammonia and hydrogen sulphide.

Carbon dioxide concentrations in the analysed goat house did not exceed the standards recommended by the Minister of Agriculture and Rural Development (Dz.U., 2003), according to which CO_2 concentration should not exceed 3000 ppm. Myczko (1996) reported that carbon dioxide concentration in a goat house should not exceed

2500 ppm, while long-term exposure of animals to higher concentrations negatively affects the oxidizing processes and increases bone demineralization.

In our study, the highest concentrations of carbon dioxide were found in the spring period (approx. 3000 ppm), which indicates poor operation of the ventilation system. The measurements showed that in the analysed goat house, there were small amounts of ammonia and no traces of hydrogen sulphide (Table 1).

Living organisms come into constant interactions with the environment with which they form a symbiotic whole. It is without doubt that intensive animal breeding is a considerable burden on the environment, i.e. soil, water and air.

Measurement of ozone (O_3) concentration is an indirect indicator of air purity. The presence of all kinds of chemical contaminants affects ozone degradation and reduces its levels in the environment. In the analysed goat house, ozone concentration in air ranged from 25 to 39 ppb, and outside the building it varied according to season of the year and distance from the building. The range of goat house odours, determined based on ozone concentration measurements, was approx. 50 m, which may indicate that goats are less of an environmental nuisance than cattle (Tombarkiewicz et al., 2004).

When analysing the extent of air environment pollution by a breeding farm, microbiological contaminants should be accounted for in addition to chemical contamination. They depend mostly on the sanitary standard of the livestock building. One of the indicators of sanitary standards is the quantity and quality of microorganisms in the air. Microbiological contaminants include bacteria, viruses and spores of fungi and actinomycetes present in the air in the form bioaerosols. The degree of contamination of livestock building air with microorganisms depends, among others, on the number and stocking density of animals, housing system, feed dispensation method, hygienic conditions, and the presence of diseased animals (Kluczek, 1999). It seems that the human factor and proper care for cleanliness and hygiene in the facility are also very important.

Total microorganism count in indoor air is regarded as an indicator of the sanitary and hygienic condition. In the external air, microorganism count reaches 1000 cfu/m^3. Microorganism count is greater in the livestock building environment than in atmospheric air and usually ranges from 100×10^3 to 1 million cfu/m^3 . 1 m^3 of air contains several hundred thousand to several million harmful microorganisms in dirty, damp and unventilated livestock facilities, and from dozen to several dozen thousand per m^3 in clean and well-kept facilities (Marcinkowska, 2002).

Our own analyses showed that in the summer period, total bacteria count in the air of the goat house clearly exceeded the borderline value of $100 \times 10^3/m^3$, which is regarded as unfavourable for many animals (Marcinkowska, 2002). It is alarming that the highest bacterial count in this period was recorded in the milking parlour (315.3×10^3 cfu/m^3 of air) with a slightly lower value in the goat house (Table 2), which suggests that the sanitary standard of these facilities was not very high. In the summer period there was also the highest emission of bacteria to the environment, especially in the immediate vicinity of the goat house (30.6×10^3 cfu/m^3 of air), indicating a strong contamination of atmospheric air (PN-89/Z-04111/02).

Standard microclimatic studies showed that during the summer measurement, thermal and humidity conditions in the goat house favoured the development of microorganisms. Similar results were obtained by Szeleszczuk et al. (2001) and Tombarkiewicz et al. (2000, 2004), who found the number of microorganisms in the air of livestock buildings to increase together with increased temperature. This is normal because in livestock buildings abounding in "fuel" in the form of feed and residual excrements, thermal and humidity conditions favour the proliferation of microorganisms and the spread of infectious and invasive diseases.

Microbiological analyses of air showed the high emission of actinomycetes to the external environment. In the summer period, there were 233 cfu/m^3 of air at the entrance to the goat house (Table 2), which according to the Polish Standard (PN-89/Z-04111/02) means that the air was strongly contaminated with actinomycetes. A similar situation occurred in the spring period, when medium contamination of air with actinomycetes was found 5 m from the goat house. The number of actinomycetes decreased further away from the building, which shows that the source of emission were the goat house and the milking parlour, where the number of actinomycetes ranged from 2933 cfu/m^3 of air in the summer to 8900 cfu/m^3 of air in the spring (Table 2). Some species of actinomycetes can cause infections in both animals and humans, giving rise to diseases such as actinomycosis and nocardiosis. In addition, some actinomycetes act like strong allergens and can lead to pulmonary alveolitis (Marcinowska, 2002).

The presence of staphylococci in air is of great importance to its sanitary quality. According to Marcinowska (2002), the permissible number of staphylococci in the air of livestock buildings is 1000 cfu/m^3. In the goat house and milking parlour studied, each measurement showed the presence of non-pathogenic (mannitol-negative) staphylococci whose number exceeded the standard considerably. In the present study we found a considerable emission of these bacteria to the external environment. At 25 m from the goat house, medium and in several cases strong contamination with staphylococci was found (Table 2) (PN-89/Z-04111/02). In the summer period, the air of the goat house was found to contain potentially pathogenic (mannitol-positive) staphylococci, which is evidence of the poor sanitary condition of the goat house and milking parlour (Table 2). These staphylococci were also found in atmospheric air 5 and 25 m from the goat house. The emission of these staphylococci was large enough for the air to be regarded as highly contaminated. Due to the action of wind, microorganisms can be carried over greater distances, causing mass-scale epidemics of contagious diseases (Kluczek, 1999). The number of fungal spores determined in atmospheric air during the measurements showed that the air was not contaminated mycologically (PN-89/Z-04111/03).

As previously mentioned, hygienic standards are aimed to provide optimum conditions for animals to keep them healthy and make them produce high-quality products that are safe to consumers.

Milk is the main product obtained from goats (Haenleinen, 2007). Udder health is measured by somatic cell count, which increases in the case of udder inflammations. The milk obtained from healthy udders as well as the inflammatory secretion contain lymphocytes, polynuclear granulocytes, macrophages and epithelial cells, which are jointly known as somatic cells (Malinowski, 2001).

In the milk of healthy goats, somatic cell count varies widely (from several hundred to several million per cm^3 of milk) according to stage of lactation. Polish Standards (PN-91/A86005) specify no permissible limit for the somatic cell count in goat milk. Many authors recommend assuming one million of cell elements per cm^3 of milk as a physiological norm (Wilson et al., 1992; Paape et al., 2007).

In the analysed milk, mean values of somatic cell count exceeded this standard at each stage, ranging from $1442.2 \times 10^3/cm^3$ of milk in the winter period to $3621.5 \times 10^3/cm^3$ of milk in the summer period. Somatic cell count in the bulk milk is generally lower in winter and higher in summer. Stress related to high temperature often increases the susceptibility to infection, while high temperature and humidity favour the proliferation of microorganisms (Malinowski, 2001).

In a study by Kalinowska (1996), mean somatic cell count was $347 \times 10^3/cm^3$ for milk samples from healthy udder lobes, $1907 \times 10^3/cm^3$ for milk from lobes with secretion disorders, and $3457 \times 10^3/cm^3$ for milk from lobes with subclinical mastitis. It is thought that in the present study, in which somatic cell count in goat milk in the winter and spring periods averaged $1442.2 \times 10^3/cm^3$ and $1548.3 \times 10^3/cm^3$, respectively, goats were affected by milk secretion disorders. In the summer period, mean somatic cell count was $3621.5 \times 10^3/cm^3$ of milk, which indicates subclinical mastitis.

Blood tests are basic tests in medical analysis. Blood is a bodily fluid that serves several functions in the organism. Among others, it plays a defensive role thanks to the presence of white corpuscles, antibodies and antitoxins. In addition, it plays transport and regulatory roles. Under physiological conditions, the number of formed elements of blood assumed certain fixed values in different species of animals. Fluctuations in the number of formed elements in blood depend mainly on the number of erythrocytes. In sick and anaemic animals, the number of formed elements is lower than in healthy and well-fed animals (Ewy, 1989).

The number of erythrocytes per mm^3 of goat's blood should range from 7 to 15 million (Winnicka, 2004), and their main task is respiratory exchange and maintenance of constant blood pH. In the blood of the goats studied, the number of erythrocytes was small and mean values were within physiological range (near the lower limit) only in the summer period (Table 3). The smallest number of erythrocytes was found in the spring period, when it ranged from 2.1 to 4.7 million per mm^3 of blood. The small number of erythrocytes may be indicative of malnutrition. Vitamin B12, iron, copper and cobalt deficiency in food is particularly unfavourable (Jelinek et al., 1996). Haemoglobin is the pigment of erythrocytes and a carrier of O_2 and CO_2. Haemoglobin concentration in the blood of goats should range from 9 to 15 g/dl of blood (Winnicka, 2004). The amount of haemoglobin varies according to age, sex, climatic conditions, and nutrition. The total amount of haemoglobin in a healthy animal is proportional to the number of blood cells. Reduced number of blood cells reduces the amount of haemoglobin. The amount of haemoglobin in blood cells can also decrease in some diseases. Analysis of the number of erhythrocytes and haemoglobin levels in each stage of the study showed there was no constant proportion between these components. According to Ewy (1989), the number of erythrocytes should be directly proportional to the level of haemoglobin. In the present study, the variable number of erythrocytes was paralleled by a constant level of haemoglobin, which means that the above ratio varied for each measurement. This may indicate a disease in the animals studied in the spring, when the level of erythrocytes was drastically below the reference values (Table 3). Haematocrit is an indicator used together with other haematological indicators to identify anaemia. In the blood of the goats studied, in the spring period (Table 3) it was much below the normal level of 23–39% (Winnicka, 2004).

A disease process going on in the body is indicated by the level of leukocytes and white blood cell picture. In our study, the mean number of leukocytes in peripheral blood was 10.33÷14.02 thous./mm^3 of blood (Table 3) and was near the upper permissible range of 3÷14 thous./mm^3 reported by Winnicka (2004), slightly exceeding it in the winter period. The mean values of particular types of white blood cells were within the standards given by Winnicka (2004), but individual animals had elevated levels of neutrophils and eosinophils. The amount of neutrophils increases for infections with pus-forming bacteria, while the amount of eosinophils increases for parasitic diseases.

There is no doubt that to obtain safe and high-quality animal products, it is necessary at all stages of production to eliminate factors that may have an adverse effect on animal health and thus the value of the products obtained. Abnormal microclimatic parameters can have many unfavourable consequences. They pose a threat to the hygiene of technological processes, cause discomfort to animals, increase the risk of diseases, are a threat to the hygienic safety of animal products, and enable the emission of microorganisms and harmful gases to the external environment.

Based on the analysis of the results obtained and observations made during the experiment, the following conclusions were made:

– The values of microclimatic parameters in the goat house studied did not deviate from recommended standards, which shows the good hygienic potential of the goat house evaluated.

– The number of microorganisms (often exceeding permissible values) and the presence of pathogenic microorganisms in the air are proof of poor sanitary standards of the goat house, while the analysis of external air shows that the goat house was responsible for microbiological contamination of external air.

– The elevated somatic cell count in milk points to poor udder health and suggests poor quality of the milk obtained from these goats.

– The analysis of blood tests, especially erythrocyte indicators shows the presence of a disease in goats in the spring season or is evidence of malnutrition.

– The presence of pathogenic microorganisms in goat house air paralleled by good hygienic state of the building's hygienic potential are evidence that cleanliness in the building was neglected.

– The fashion for consumption of goat milk products, in particular greater consumption of fresh milk (especially by children and sick people) indicate the need for developing physicochemical and bacteriological standards for goat milk, which have to be strictly enforced.

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Zoohigieniczne warunki koziarni w aspekcie wybranych parametrów zdrowotnych kóz

STRESZCZENIE

Celem pracy była ocena warunków zoohigienicznych koziarni w aspekcie wybranych parametrów zdrowotnych kóz oraz zanieczyszczenia zewnętrznego środowiska powietrznego wokół fermy kóz. Badania wykonano w trzech sezonach roku: zima, wiosna oraz lato, na fermie kóz liczącej 600 matek stada podstawowego. Badania obejmowały ocenę podstawowych parametrów mikroklimatycznych, pomiary stężenia ozonu wewnątrz i na zewnątrz budynku, mikrobiologiczne analizy powietrza wewnątrz i na zewnątrz koziarni, analizy mleka na zawartość komórek somatycznych oraz podstawowe analizy krwi. W badaniach wykazano dobry potencjał higieniczny budynku odnośnie większości parametrów mikroklimatycznych (oprócz wskaźników termicznych) przy jednoczesnym złym standardzie sanitarnym, o czym świadczy obecność w powietrzu gronkowców potencjalnie chorobotwórczych. Liczba komórek somatycznych w mleku przekraczała dozwolone normy i wskazywała na stany podkliniczne wymienia, a wyniki analiz krwi, zwłaszcza w okresie wiosennym, wskazywały na niedożywienie zwierząt lub procesy chorobowe. Na uwagę zasługuje fakt, że pomimo coraz powszechniejszego spożywania mleka koziego i jego przetworów nie ma dla niego ustalonych szczegółowych norm.