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Influence of Feed Quality on the Properties of Milk.

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ABSTRACT

The present study reviews a practical case of a central Kazakhstani dairy farm, where milk quality deteriorated due to the poor quality of succulent fodder. The research objective was to determine the effect of fodder, with quality deviations, on the physio-chemical properties and safety of milk, as well as to establish the relationship between the quality of fodder used and the final product. Organoleptic and laboratory studies were performed on milk samples, and the relationship between milk and fodder quality was examined. It was found that high concentrations of somatic cells in milk were caused by fungi in fodder. In addition, low-quality fodder was found to be related to the use of ferment that contains insufficient numbers of microorganisms for the conservation of succulent fodder. The research results presented in the article will be of interest to practicing veterinarians, animal technologists and professionals participating in fodder conservation for productive animals.

Keywords: Quality and milk safety, mycotoxins, microfungi, yeast, succulent fodder.

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INTRODUCTION

Milk is one of the most valuable food products. It includes about 200 essential substances for humans and young stock. It is the only food product that provides young mammals with all the necessary nutrients. Milk increases the neuropeptide activity in the brain, creating new connections and new neuro-semantic contours. Milk fat is the basis for the synthesis of synovial fluid, ensuring proper lubrication of the articular surfaces. The high nutritional value of milk is associated with the optimum content of human proteins, fats, carbohydrates, minerals and vitamins necessary for nutrition.The peculiar feature of many milk components is that they cannot be found in any other food products. Milk is one of the most frequently used livestock products. In Kazakhstan, like in other countries, a dairy cattle breeding is one of the largest sectors. For instance, in 2014 Kazakhstan produced 5,020 tonnes of milk. The growth of milk production volume in 2015 was 2.4%, while in the period January-July 2016, 242,5 tonnes of milk were produced[1].However, it should be noted that milk production covers only 70% of domestic demand; the rest is imported from the Russian Federation, Belarus and Ukraine.

Milk and dairy products are among the main components in human nutrition, so the main task of manufacturers is to get not only a great amount of milk, but also high quality products with the desired properties, i.e., relevant to appropriate standards. The quality of milk today is a clear system of measures that prevent the cause and determine ways to eliminate possible deviations from the norm. Therefore one of the main problems in obtaining safe milk is the creation of food based on high quality fodder[2] with the use of grazing areas[3].

Large amount of so-called 'taints' of milk, are the result of feeding poor quality fodder contaminated with pathogenic bacteria and toxigenic fungi. This is dangerous for the health of the consumer. Many researchers have indicated a direct correlation between fodder quality, the number of productive animals used and the quality of finished products. Due to errors in feeding, the smell and taste of milk can also change [4].It is no wonder that there is a saying among people 'What is on a cow's tongue, that is in the milk' or similar 'Milk is onthe cow's tongue', indicating that the quality and safety of milk depends on the quality and food safety. But in addition to feeding, there are other factors, such as the sanitary condition of the cow's udder before milking, milking technology, etc.[5].

Methods and time of fodder conservation have a significant impact on the nutritional value of fodder [6]. Primarily, this is due to the biochemical transformations of nutrients in the respiration process in tissues of harvested plants before their complete conservation.

It is often the case when silage is preservedon peasant farms, it is characterised by poor quality. It has inflated acidity with a high concentration of organic acids, among which acetic acid takes the main share, and sometimes also butyric acid. When feeding cattle with this silage, their physiological condition gets worse and productivity and quality of milk decreases[7].

Recently, fermenting with lactic-acid bacterium has been used during ensilation [8-10], which has greatly improved the quality of preserved fodder due to the inhibition of epiphytic organisms (coliform and acetic acid bacteria, yeast fungi, mould), that cause the spoilage of fodder[11]. The most common cause of the preserved fodderspoilage is mould deterioration.

The fodder of plant origin, contaminated by mould can be a real threat not only to the health of farm animals, but also to the health of humans. If the fodder is contaminated, there is a possibility of mycotoxins accumulatings–which are the secondary metabolites ofmould fungi [12].

There are more than 250 species of microscopic fungi that produce, according to the various sources, more than 400 mycotoxins [13,14, 15].Scientists around the world pay more attention to their pronounced toxigenic and carcinogenic properties. There are five mycotoxins: aflatoxins (mainly Aflatoxin B1 and milk - Aflatoxin M1), ochratoxins (mainly Ochratoxin A), fumonisins (Fumonisin B_1), zearalenone and patulin[16].

It was reported for the first time about Aflatoxin B1in the early 1960s, when there was a high death rate among turkeys, ducks and chickens in the UK, fed with peanuts brought from South America (Brazil). That

time the disease was called Turkey 'X' [17]. Nowadays there is a large number of scientific papers dedicated to the problem of mycotoxin [18].

In literature data it is noted that contamination of fodder with fungi, including microscopic, remains as a serious problem. More than 30% of the world's gathered food and fodder crops are contaminated by mycotoxins, i.e. secondary metabolites of fungi [19]. A disease such as ergotism that is caused by spore fungi, has been known since ancient times. It can also cause intoxication of animals and humans from eating infected feed grains [20]. Additionally, Brambillaet al.,[21] reports that there is a possibility of the presence of the corn used for silage, and other toxic substances.

Plant substrates, disseminated by microscopic fungi, cannot be used in animal feed without proper sanitisation, as large doses of mycotoxins in animals cause pronounced signs of poisoning, leading to the production of unsafe meat and milk, as well as the death of the animals [22].In small doses, a mycotoxin does not lead to significant deviations, however, it results in significant losses due to the loss of productivity, weight gain, weakening the body's resistance, thus creating favourable conditions for the emergence of many infectious diseases [23,24,25].As it is known, the contamination is not just made by onemicroscopic fungus, but it is typically produced by several species which metabolises different mycotoxins, which in complex have a more pronounced toxic effect causing various diseases. For example, in Bulgaria and South Africa, pigs and chickens were diagnosed with nephropathy, which arose due to the presence of several mycotoxins: ochratoxin A, penicillinic acid and fumonisin B1 [26,27] in the fodder.

Kislyakova [28]has developed a mycological silage analysis, which allows identifying fungi belonging to mesophile species, as well as thermo tolerant fungi species. Pathogenic properties in isolated silos of fungi were identified (Aspergillus fumigatus, Absidiaramosa and Absidiacorymbifer), which give grounds to consider their possible agents of aspergillosis, and mucormycosis of farm animals, which diet includes silage feed.

While studying the influence of mould on the metabolism, Nikulina & Aksenova[29]have found out a violation of the metabolic processes because of the use of contaminated mould in the diet. As the result, the feeding of calves with milk contaminated bymouldled to the reduction of body weight, oligotrophy and an immunodeficiency disorder.

The issue of aflatoxin concentration in milk concerns numerous scientists of the world, pointing to the danger of these contaminants [30,31,32]. The most dangerous mycotoxin that is contained in milk is aflatoxin M1, produced from aflatoxin B_1 [27].

Nowadays, it is not possible to reduce the contamination of fodder by microscopic fungi and mycotoxins, even though there are many ways of decontamination and neutralisation through chemical and physical means [33]. It is important to understand and assess the existing risks in order to minimise the effect of mycotoxins, contained in the fodder, on animals and products derived from them [34], as well as to reduce economic losses and long-term effects [35].

Thus, the analysis of above mentioned studies dedicated to this topic show that the fodder quality has a direct impact on the quality and safety of milk products.

The objective of this study is to determine the effect of fodder, on the physic-chemical properties and safety of milk, as well as to establish the direct relationship of quality of the fodder fed by animals to the milk products derived afterwards.

MATERIALS AND METHODS

The material of the study are the samples of Holstein cows breed milk, samples of succulent fodder-silage and haylage and ferment for silage conservation.

Selection of milk samples carried out in accordance with All Union State standard P ISO 707-2010 'Milk and dairy products. Guidance on sampling'.

Organoleptic testing of the milk was carried out according to NS RK 1732-2007 'Milk and dairy products. Organoleptic testing on determining quality indicators'. A colour is referred to the organoleptic characteristics of milk, scent, taste and texture, on the basis of which to establish the existence of certain defects.

The colour of milk was determined in a glass cylinder and was scanned by the reflected light.

The scent of milk was determined by warming the vessel to 25-30 ° C.

The taste of milk was determined in warmed vessels by taking a sip and gargling in the mouth without swallowing. After each test the oral cavitywas washed.

The texture of the milk was measured at a slow transfusion of one cylinder to another.

Physical and chemical characteristics of milk (fat, protein, lactose, non-fat milk solids, density, and freezing point) were studied in the milk analyser «EkomilkTotal». The acidity of the milk is determined in accordance with All Union State standard 3624-92 'Milk and milk products. Titrimetric methods for the determination of acidity' and All Union State standard 26781-85 'Milk. pH Measurement Method 'used in EAEC countries. In this regard, ion meter '827 pH Lab Metrohm' and digital titrator 'Titration station STI' were used.

The amount of milk somatic cells was determined on the analyser «EkomilkSkan AMB 1-03».

Microbiological safety of milk was determined by interstate All Union State standard 31659-2012 'Food Products. Method for detection of Salmonella bacteria' and All Union State standard 32031-2012 'Food Products. Methods for detection of Listeria monocytogenes bacteria'.

The determination of aflatoxin M1 was carried out by testing toxicity of milk, where the rapid test-SNAP Aflatoxin M_1 and enzyme immunoassay (EIA) were used in accordance with the instructions for use in the kit MA440 / 441 I'screen AFLA M1 (Tecna R & D Diagnostics Biotechnology, Italy).

Quality of succulent fodder silage and haylage assessment was determined by measuring the pH, general free acidity, using the above mentioned equipment. Mycological studies on the presence of yeast and mould were carried out by culturing of selected samples on Czapek and Saburo agars. The concentration of aflatoxin B1 in fodder was determined by ELISA, using a set of CELER AFLA B1(Tecna R & D Diagnostics Biotechnology, Italy).

Ferments applied for silage and haylage preservation were examined to determine the concentration of lactic acid bacteria Lactobacillus plantarum DSM 8862 and DSM 8866 on All Union State standard 10444.11-13 'Microbiology of food and animal fodder. Methods for detection and counting the number of mesophilic lactic acid microorganisms'. For this purposebiological safety cabinet of class 2 was used.

Digital material is processed biometrically according to Kryuchkov & Marakulin[36], with the help of Microsoft Excel 2016 programme for the calculations.

RESULTS AND DISCUSSION

Milk studies results

The milk samples were collected at the peasant farm as general gathering marked №1, 2 and 3, as well as from individually selected clinically healthy, with signs of mastitis cows (№4-13).

Selected samples of milk were investigated according to the organoleptic, physic-chemical and microbiological parameters. As a result of organoleptic testing of the majority of samples, special variations of colour, scent and texture were not observed. Sample №4 had a discreet smell of sour milk. Equivalent, but less distinct, was the sample №1. In determining the taste of these samples, a sour one felt distinctively.

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From basic physical and chemical indicators of milk, the levels of fat, protein, lactose, milk solids, non-fat (MSNF) and the density were determined. Table 1 shows the results of laboratory tests.

Table 1: The results of physical and chemical parameters of the tested milk

Sample number	Test results				
	Fat, %	Protein, %	Lactose, %	MSNF, %	Density, ºA
1 (general, complex1)	4.77±0.07	3.06±0.01	4.52±0.01	8.21±0.03	26.94±0.09
2 (general, complex 2)	4.53±0.01	3.14±0.01	4.65±0.01	8.45±0.01	28.08±0.01
3 (general, complex 3)	3.95±0.01	3.14±0.01	4.87±0.01	8.48±0.01	28.65±0.03
4	4.26±0.01	3.10±0.01	4.59±0.01	8.33±0.03	27.83±0.13
5	2.11±0.01	3.18±0.01	4.84±0.01	8.68±0.01	30.95±0.01
6	4.01±0.01	3.05±0.01	4.54±0.01	8.22±0.03	27.59±0.13
7	3.06±0.01	3.32±0.01	4.98±0.02	8.99±0.02	31.43±0.07
8	4.35±0.02	3.05±0.01	4.51±0.01	8.18±0.03	27.20±0.01
9	4.27±0.01	3.03±0.01	4.49±0.01	8.15±0.01	27.10±0.02
10	4.26±0.01	3.04±0.01	4.91±0.01	8.23±0.01	27.30±0.01
11	3.88±0.01	3.07±0.01	4.57±0.01	8.29±0.01	27.98±0.05
12	3.78±0.01	3.00±0.01	4.85±0.01	8.09±0.01	27.26±0.05
13	4.64±0.01	3.10±0.01	4.57±0.01	8.30±0.01	27.42±0.03

Table 1 shows that the fat percentage of milk in sample №1 exceeds the percentage of protein in 1.71%, i.e., ratio of 1.55: 1, indicating a violation of metabolic processes in the body of cows. Fat and protein ratio of more than 1.5 causes cow ketosis. In milksample №13, the ratio was 1.49:1, which is close to that with metabolic disorders. In milk sample №5, the protein concentration is greater than fat at 1.07%, indicating animal disease (possible mastitis). In cow's milk №7 protein is also higher than the fat concentration at 0.26%.

When studying the titratable acidity of the milk samples, it was determined that all samples had inflated the acidity between 20.0 to 28 ºT, as it is shown in Table 2. Samples with the highest acidity of milk are №4 - 28.0, №7 and №8 24.0 ºT accordingly. The total titratable acidity of the sample №1 is –25.1 ºT.

The results of somatic cells studies in milk samples revealed that the quantity is in acceptable level but some samples had shown the results above the required ones (Table 3).

Thus, in sample №11 there were 566.0 thousand somatic cells per 1 ml.; in sample №5 -. 512.3 thousand per 1 ml. Scientific consensus regards a somatic cell concentration of more than 500 thousand. per 1 ml. in milk is abnormal. Abnormal milk is considered to be the one with admix of colostral milk, as well as it is obtained in the last 7 days of lactation with subclinical mastitis or other violations of the health of an animal in which the content of somatic cells in milk increases, while cow productivity is reduced by on average of 10% [37].

Table 2: Titratable milk acidity determination results

Sample number	Titratable acidity,ºT	
	with respect to the norm	actual
1 (general, complex 1)	for premium and first class 16-18	25.1±0.26
2 (general, complex 2)		22.5±1.04

	second class 16-21	
4		28.0±0.60
5		20.0±0.76
6		23.5±1.04
7		24.0±1.13
8		24.0±1.15
9		21.5±1.26
10		22.0±0.58
11		20.5±0.29
12		22.0±0.58
13		23.0±0.58

According to Kurak[38] a large amount of somatic cells in milk leads to a serious decrease in its quality indicators: loss of biological usefulness, deterioration of technological properties during processing, reductions in the acidity of milk, fat, casein and lactose loss. Milk becomes less thermally stable, is worse with coagulation oflab ferment and slows the development of beneficial lactic acid bacteria.

Our results correspond with the given information of Kurak[38]. Thus, in case of the indication with the amount of 566.0 thousand somatic cells per 1 ml. the acidity and concentration of fat is reduced, as compared to the other samples. This data had low value in the sample containing 512.3 thousand somatic cells per 1 ml.

Table 3: Quantity of somatic cells in milk samples

Sample number	Test results, thousands in 1 ml	
	with respect to the norm	actual
1 (general, complex 1)	until 750.0 (TR CU * 033/2013)	235.2±4.67
2 (general, complex 2)		229.0±2.03
3 (general, complex 3)		178.0±13.28
4		90.0±2.89
5		512.3±17.7
6		215.0±5.24
7		124.0±2.96
8		231.0±0.88
9		303.0±4.33
10		198.0±4.04
11		566.0±4.91
12		341.3±10.9
13		102.0±6.93

* TR CU – Technical Regulation Custom Union

The results of milk studies on aflatoxin M1 showed its absence using 'SNAP-Aflatoxin M1' qualitative rapid test, as well as the concentration below 0.01 mg / L of the majority of samples as determined by ELISA using a kit MA440/441 I'screen AFLA M1. In milk sample №11 concentration of aflatoxin M1 was 0.051 mg/l, in sample №9 - 0.038 and in sample №5 - 0.032 mg/l, however the concentration data is valid, according to TR CU 021/2011 'On food safety' where MRL should not exceed 0.5 mg/kg.

The results of the succulent fodder studies

From the obtained results, significant increase of titratable milk acidity in almost all samples was of concern. To identify the reasons for this indicator increase succulent fodder - silage and haylage fed to lactating cows were sampled.

The studied silage and haylage were preserved at afarm household during summer period using ferment, containing lactic acid bacteria Lactobacillus plantarum DSM 8862 and DSM 8866. Maize on the stage of waxy ripeness was used for the production of silage; for haylage harvested barley in the phase of milky-wax and wax ripeness. Silage and haylage preparation was made in bunker silo and laying into the mound.

Fodder silage technology is related to the creation of the 'acidic' conditions in preserved green mass. Such conditions provide high safety of silage nutrient substances. At high acidity does not reproduce the microorganisms that break down nutrients and synthesise toxins (putrefaction and butyric acid bacteria, yeasts and mould).

Acidic conditions are caused by the activity of lactic acid bacteria, which, thanks to LDH ferment are able to synthesise lactic acid. It is synthesised from the sugars, contained in the fodder cultures, which differ in ferment capacity.

In organoleptical study of the succulent fodder samples, it was determined that silage and haylage had an unpleasant vinegary odour, which is not normal for lactic acid fermentation. Sour taste of fodder does not depend on its acidity (pH), which essentially is a measure of hydrogen ion concentration, indicative of a degree of dissociation in the silo contained organic acids. It is commonly known that the sour taste is determined by general titratable acidity, which in turn is indicative of the amount of undissociated acid in the animal feed [39].

Table 4 shows the data to determine general acidity of the silage and haylage, which was determined by a titration method of tested fodder.

Table 4: General acidity of succulent fodder

Sample item	with respect to the norm	Test result
haylage 1 (bunker)	180-200	241.0±1.00
haylage 2 (bunker)		219.33±2.33
silage 1 (bunker)	260	411.07±0.97
silage 2 (bunker)		360.33±5.70
silage 1 (mound)		360.0±3.51
silage 2 (mound)		380.67±3.18
silage 3 (mound)		409.67±4.48

Permitted silage acidity is the value of 260, in haylage, this figure should be at the level of 180-200 units.

The results showed that the acidity of the silage made in different structures (surface and underground) exceeds the permitted limit of acidity by 38-58%, the acidity of the haylage was also higher by 10-20%.

The pH indicator was slightly lower than normal, which is 4.0-4.2, i.e., the silo was a more acidic environment, which is probably due to the high content of organic acids in tested fodder.

Furthermore, in the studied silage samples with quality Nessler reaction products of primary protein breakdown have been found - ammonia compounds. The tested extracts from samples of silage, after adding the Nessler reagent, turned orange, indicating a significant content of ammonium compounds.

Ammonia compounds can be detected in non-compliance with silage technology, i.e. detection of the primary protein breakdown product indicates poor quality of silage.

The quality of fodder preservation often depends on the acidification speed of green mass. The number of lactic acid bacteria in plants is not always conducive to the timely acidification, which in turn increases the risk of undesirable microorganisms.

The results of the toxicological studies

As a result of studies of the selected sample of succulent fodder (silage, haylage), the following colonies of microscopic fungi weredetermined: Yeasts, Aspergillus fumigatus, Asp. glaucus, Asp. niger, Asp. sydowii, Trichoderma.

While conducting research on the content of metabolites of microscopic fungi - only trace amounts of Aflatoxin B1 were found in the samples - from 0.063 to 0.097 mg/kg, which does not exceed the maximum allowable concentrations, relative to compound feed concentrates for cattle, according to the project TR CU 'On safety of feed and feed additives '.

In technical regulation 'Requirements to safety fodder and supplement feeds' on March 18, 2008 №263, it is indicated that signs of mould, odours in succulent fodder (musty, mouldy, putrid) are not allowed. Exact MRL values of aflatoxin B1 in succulent fodder in technical regulations and TR CU draft are not shown, so we focused on MRL regarding feed concentrates for cattle.

Despite the fact that aflatoxin B1 was found in low concentration in test fodder samples, it has a certain danger, as this is toxic mycotoxin which is able to accumulate in the liver of animals, reduces the immune status of the organism and has hepatocarcinogs properties [40,41].

The presence of microscopic fungi in succulent fodder is not a sufficient evidence of the content of lactic acid bacteria that maintain an acidic environment and do not allow mould and yeast develop.

We studied the yeast that was used for the preservation of silage, due to the presence of fungi and yeast in the tested fodder. Ferment packaging indicates that 1 g contains 3 × 1011 lactic acid bacteria *Lactobacillus plantarum* DSM 8862 and DSM 8866.

As a result of microbiological examination, we found that the number of *Lactobacillus plantarum* was 7 × 108 CFU / ml, which does not correspond to the number indicated on the package, i.e. significantly lower titer.Therefore, the use of yeast, which has lactic acid bacteria concentration of 7 × 108 CFU / ml, does not satisfy the requirements of the technology for succulent fodder preservation. As biological agents use pass state quality control, it is possible that during the storage period the temperature regime was violated, which led to the death of microorganisms.

Thus, as a result of violation of succulent fodder conservation technology, applying silage ferment lactic acid bacteria that do not meet the requirements, non-quality fodder was produced. Favourable conditions for foreign microorganisms were created in such fodder - yeast, fungi, accompanied by the development of butyric acid and acetic acid bacteria forming butyric and acetic acid, which in turn increased the total acidity and thus affect the acidity of producing animals milk fed silage and haylage.

CONCLUSION

The quality of the milk must comply with the requirements. Deviations in any physical-chemical indicators of milk entail a number of problems. The main problem for dairy producer is the impossibility of receiving milk to process it into fluid milk and milk products**.** Such milk has to be disposed, leading to great financial losses. Changing the proportions of fat and protein can be the sign of animal diseases, disorders of metabolic processes occurring in the majority of cases due to improperly compiled diet or feeding poor quality fodder.

The quality of fodder used is a very important indicator of milk production. Particular attention should be paid to succulent fodder conservation. Violation of technology of silage and haylage conservation led to a decrease in its quality, changes in acidity in the future development of adverse microbiological environment, the growth of dangerous moulds, etc.

Conducting our study of succulent fodder, microscopic yeast and fungi of the genus of Aspergillus, which are toxigenic were found. Low concentrations of aflatoxin B1 were detected, which in small doses as well as other mycotoxins, lead to a decrease in productivity and increase in body weight, create favourable conditions for the development of many non-communicable and infectious diseases, which were previously shown in our experiments [42], and as some authors pointed [43,44,45,46].

Long-term effects of mycotoxins actions appear as immunosuppressive, carcinogenic, mutagenic, allergenic, neurotoxic and teratogenic effects, as well as the suppression of reproductive function [47,48]. In addition, mycotoxins in contaminated fodder, as a rule, are in different combinations of mutually reinforcing negative impact [49].

Some mycotoxins have utter anti-microbial properties, causing a decrease in the number of beneficial microorganisms, including cellulose activity, bacillus, lactate-utilizing bacteria.

Distortion in microbiocenosis structure may negatively affect both the digestion and nutrientsdigestibility process and the efficiency of the protective functions of beneficial microflora in the gastrointestinal tract, which leads to the development of pathogenic microorganisms, thereby increasing the number of somatic cells in milk, what was discovered in our research (in some samples it reached 566.0 ± 4.91, 512.3 ± 17.7 thousands in 1 ml).

Thus, the presence of mould is one of the reasons for high concentration of somatic cells in milk of the tested cows.

High-producing cows have the greatest susceptibility to the adverse effects of mycotoxins, as productivity growth is always accompanied by increased sensitivity to stress. In conducting studies to determine of aflatoxin M1 in the milk, traces in some samples were found, i.e. studied milk samples corresponded to the requirements of normative documents of the Eurasian Union. It was also found that concentrations were more demanding compliance with regulations of the European Union, where aflatoxin M1 in milk may be at a concentration of 0.05 mg / kg [50].

Conducted mycological studies have shown a large concentration of yeast in succulent fodder. With the yeast growth occurs alcoholic fermentation in silage, ethyl alcohol are accumulated. Whereupon there is intense growth of acetobacters, causing silo spoilage, resulting in increased acidity of milk and low thermal stability. When giving defective silage and its abundance in the diet mineral metabolism is disturbed (calcium and phosphorus, protein), which also leads to the high acidity of milk, as was indicated by our results.

Yeast and acetic acid bacteria are aerobes, so significant concentration of acetic acid in the silo and therefore it spoilage is noted in violation of silage technology, insufficient creation of anaerobic conditions.

Moulds (Aspergillus) found in large quantities are beginning to grow in the presence of air in the silo, which promotes an intensive development of moulds and yeasts. These microorganisms are always found on the plants, so their rapid reproduction begins under favourable conditions.

Moulds in silage and haylage are the main cause of such diseases and symptoms as inflammation of the udder (mastitis), hoof disorders in reproduction problems, diarrhoea, reduced immunity, low productivity, poor quality colostrum and weak calves etc.

Main reason for poor quality of succulent fodder were discovered during comprehensive survey conduction - insufficient for normal silage number of lactic acid bacteria Lactobacillus plantarum. As a result, manufacturing technology of the succulent fodder was violated, which led to the dynamic growth of the yeast cells and microscopic fungi that are able to secrete mycotoxins. In addition, there was an increase of acidity and decrease of the allowable pH. Feeding dairy cows such fodder has led to an increase in the acidity of the milk and defects in taste and scent.

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REFERENCES

[1] Committee on Statistics of Kazakhstan. 2016. http://www.stat.gov.kz/faces/homePage?_adf.ctrl-state=jru5x1c7c_4&.

[2] Artemov I.A., Black R.N., Pervushin V.M., Belibekova E.B. First-class fodder – strengthening of main forage supply. The technology of fodder harvesting and use. – Moscow, 2003; 26-32.

[3] Stergiadis S., Leifert C., Seal C.J., Eyre M.D., Larsen M.K., Slots T., Nielsen J.H., Nielsen J.H., Butler G. A 2-year study on milk quality from three pasture-based dairy systems of contrasting production intensities in Wales. The Journal of Agricultural Science. Volume 153, Issue 04. 2015; 708-731. DOI: http://dx.doi.org/10.1017/S0021859614000963.

[4] Zucali M., Bava L., Colombini S., Brasca M., Decimo M., Morandi S., Tamburini A., Crovetto GM. Management practices and forage quality affecting the contamination of milk with anaerobic spore-forming bacteria. Journal of the Science of Food and Agriculture. Volume 95, Issue 6, 2015;Pages 1294-1302.

[5] Khan N.A., Yu P., Ali M., Cone J.W., Hendriks W.H. Nutritive value of maize silage in relation to dairy cow performance and milk quality. Journal of the Science of Food and Agriculture. 2015;95 (2): 238-52. doi: 10.1002 / jsfa.6703. Epub 2014 Jun 2.

[6] Tyurkin I.A. Milk yield, technological properties and quality of cheese when feeding cows with corn silage prepared with the use of formic acid. Diss. the candidate with the / x Sciences, Moscow,2004;p.182.

[7] Zielińska K., Fabiszewska A., Stefańska I. Chilean J. Different aspects of Lactobacillus inoculants on the improvement of quality and safety of alfalfa silage. Agric. Res. vol. 75 no.3 Chillán, 2015.http://dx.doi.org/10.4067/S0718-58392015000400005.

[8] Chen L, Guo G, Yuan X, Zhang J, Li J, Shao T. Effects of applying molasses, lactic acid bacteria and propionic acid on fermentation quality, aerobic stability and in vitro gas production of total mixed ration silage prepared with oat-common vetch intercrop on the Tibetan Plateau. J Sci Food Agric. 2016; 30; 96 (5): 1678-85. doi: 10.1002 / jsfa.7271. Epub 2015 Jun 19.

[9] Yuan X.J., Wang J., Guo G., Wen A.Y., Desta S.T., Shao T. Effects of ethanol, molasses and Lactobacillus plantarum on fermentation characteristics and aerobic stability of total mixed ration silages. AnimSci J. 2016; 87 (5): 681-9. doi: 10.1111 / asj.12477. Epub 2015 Sep 30.

[10] Magnusson J., Schnurer J. Antifungal lactic acid bacteria as biopreservatives. Trends in Food Science and Technology. 2005;16: 70-78. doi: 10.1016 / j.tifs.2004.02.014.

[11] Bylgaeva A.A. Moulds in forages and their decontamination in the conditions of Yakutia. Disser-. Candidate of Veterinary Sciences, Yakutsk, 2004;p.141.

[12] Rodricks J. Mycotoxins and Other Fugal Pelated Food Problems. Washington, 1976;73 p.

[13] Hayes A.W. Mycotoxins: a review of biological effects and their role in human diseases. Clin. Toxicol. 1980; 17, 45-83.
[14] Nielsen K.F., Smedsgaard J. Fungal metabolite screening: database of 474 mycotoxins and fungal metabolites for dereplication by standardised liquid chromatography-UV-mass spectrometry methodology. J Chromatogr A. 2003;1002: 111-136.
[15] Huffman J., Gerber R., Du, L. Recent advancement in the biosynthetic mechanism for polyketide-derived mycotoxins. Biopolymers, 2010;93: 764-776.
[16] Blount W.P. Turkey 'X' disease. J. Br. Turkey Fed. 1961;9: 55-58.
[17] Bhat R, Rai RV, Karim AA. Mycotoxins in food and feed: present status and future concerns. Compr Rev Food SciFoodSaf. 2010;9: 57-81.
[18] Sarkisov A.K. Results and further prospects of veterinary mycology development. // Mycology condition, problems and prospects of Russian veterinary science development. / Proceedings of the scientific session of the RAAS. 1999;1: 106-108.
[19] Betina V. Biological effects of mycotoxins. In: Mycotoxins: Chemical, Biological and Environmental Aspects, 1989;9: 42-58.
[20] Brambilla G., Abate V., di Domenico A., Esposito M., Fulgenzi AR, Iacovella N., Serpe FP, Tassinari M. Non-dioxin-like PCB and PBDE deposition on Zea mays L. leaves: modelled contamination in milk from dairy animals fed on silage. Food AdditContam Part A Chem Anal Control Expo Risk Assess. 2015;32 (6): 864-73. doi: 10.1080 / 19440049.2015.1029993. Epub 2015 Apr 20.
[21] Devegovda G. The solution of mycotoxin problems. Fodder. M.,2002; №8. 65-66.
[22] Petrovich S.V. Classification of mycoses. Veterinary Medicine. Moscow,1987; 5: 38-40.
[23] Bulji Y.A. Veterinary assessment of products obtained from sick cows aflatoxicosis. Journal of agricultural sciences. Scientific journal Published by Mongolian Academy of Agricultural Sciences (MAAS). Ulaanbaatar. 2012;9 (02): 12-17.
[24] Bryden W.L. Mycotoxins in the food chain: human health implications. Asian Pac J ClinNutr. 2007; 16: 95-101.
[25] Stoev S.D. Studies on carcinogenic and toxic effects of ochratoxinA in chicks. Special Issue 'Ochratoxins'. Toxins, 2010;2: 649-664.
[26] Stoev S.D. Studies on some feed additives and materials giving partial protection against the suppressive effect of ochratoxinA on egg production of laying hens. Res. Vet. Sci. 2010;88: 486-491.
[27] Britzi M., Friedman S., Miron J., Solomon R., Cuneah O., Shimshoni JA, Soback S., Ashkenazi R., Armer S., Shlosberg A. Carry-over of aflatoxin B1 to aflatoxin M1 in high yielding Israeli cows in mid- and late-lactation. Toxins.2013; 5: 173-183.
[28] Kislyakova O.S. Microscopic fungi in the silage and their sanitary value and methods of extraction. Diss. cand. veterin. Sciences. - Moscow, 2001;p. -23.
[29] Nikulin N.B., Aksenova M.V. The intensity of post-vaccination immunity in imported and domestic animals and the level of immunoglobulins in calves in the presence of moulds in forage. Agricultural Gazette Urals, 2011;5 (84): 38-40.
[30] Han R.W., Zheng N., Wang J.Q., Zhen Y.P., Xu X.M., Li S.L. Survey of aflatoxin in dairy cow feed and raw milk in China. Food Control. 2013;34 (1): 35-39. doi: 10.1016 / j.foodcont.2013.04.008.
[31] Rojo F., Martnnez SP, Espinoza VHI, Vera MAN, De Lucas Palacios E., Velazquez WPR. Comparison of methods to evaluate aflatoxin B1 exposure in dairy cattle and the effect of mycotoxin adsorbents to reduce afm1 residues in milk / Rev Mex CiencPecu, 2014;5(1): 1-15.
[32] Scaglioni P.T., Becker-Algeri T., Drunkler D., Badiale-Furlong E. Aflatoxin B1 and M1 in milk. Analytica Chimica Acta. 2014;829(4): 68-74. doi: 10.1016 / j.aca.2014.04.036.
[33] Di Stefano V., Pitonzo R., Cicero N., D'Oca M.C. Mycotoxin contamination of animal feedingstuff: detoxication by gamma-irradiation andreduction of aflatoxins and ochratoxin A concentrations. Food Additives & Contaminants: Part A,2014; 31 (12): 2034-2039, http://dx.doi.org/10.1080/ 19440049.2014.968882.
[34] Stoev S.D. Food Safety and Increasing Hazard of Mycotoxin Occurrence in Foods and Feeds. Critical Reviews in Food Science and Nutrition, 2013;53: 9, 887-901, DOI: 10.1080 / 10408398.2011.571800.
[35] Zaki M.M., El-Midany S.A., Shaheen H.M., Rizzi L. Mycotoxins in animals: occurrence, effects, prevention and management. J Toxicol Environ Health Sci. 2012;4: 13-28.
[36] Kryuchkov, A., Marakulin I.V. Biometry. Tutorial. - Kirov: Publishing House of the VSU,2011; p.87.
[37] Kondrakhin I.P. Methods of veterinary clinical laboratory diagnostics. Directory. - Moscow. 2004;Kolos, 520.

[38] Kurak A. Insidious somatic cells. How to keep them 'in check'? J. Belarusian agriculture. 2013; №1 (129) p.37. (Electronic resource) http://agriculture.by/articles/zhivotnovodstvo/ kovarnye-somaticheskie-kletki.-kak-derzhat-ih-v-uzde.
[39] Zafren S.Y. Technology of forage preparation. Handbook. - Moscow, Kolos, 1977;p. 239.
[40] Syzdykov K.N. Maikanov B.S., Bulji Y.A. Cytochemical and morphological changes in chickens and mice infected with mycotoxins. International scientific-practical conference. Actual problems of veterinary pathology and morphology of animals. Voronezh, 2006;206-211.
[41] Benjamin Valdez.Food Industrial Processes - Methods and Equipment, book. ISBN 978-953-307-905-9, Published: February 222012; under CC BY 3.0 license. Chapter 10. Mycotoxins in Food. By Francesca Bosco and Chiara Mollea.
[42] Bulji Y.A. Veterinary assessment of livestock products in the application of animal phyto-fungicides. Thesis for the degree of candidate of veterinary sciences. Astana, 2007;153 p.
[43] Tutelian V.A., Kravchenko L.V. Mycotoxins. - M .: Medicine, 1985;p. 320.
[44] Vidal D.R. Proprietes immunosuppressives des mycotoxines du groupe destrichothecenes. Bull inst Pasteur 88, 1990;2: 159-192.
[45] Tremasov M.J. Prevention of mycotoxicosis in animals // Veterinary Russia. 2002;9: 3-8.
[46] Tanaka T., Mizukami S., Hasegawa-Baba Y., Onda N., Sugita-Konishi Y., Yoshida T., Shibutani M. Developmental exposure of aflatoxin B1 reversibly affects hippocampal neurogenesis targeting late-stage neural progenitor cells through suppression of cholinergic signaling in rats. Toxicology. 2015;336: 59-69. doi: 10.1016 / j.tox.2015.08.001.
[47] Luongo D., Russo R., Balestrieri A., Marzocco S., Bergamo P. Severino L. Invitrostudyof AFB1 and AFM1 effectsonhumanlymphoblastoidJurkat T-cellmodel. Journal of Immunotoxicology. 2014;11 (4): 353-8. DOI: 10.3109 / 1547691X.2013.848250.
[48] Santos J.S., França V.R., Katto S., Santana E.H. Aflatoxin M1 in pasteurized, UHT milk and milk powder commercialized in Londrina, Brazil and estimation of exposure. Arch Latinoam Nutr, 2015; 65 (3): 181-5.
[49] Tsiplakou E., Anagnostopoulos C., Liapis K., Haroutounian S.A., Zervas G. Determination of mycotoxins in feedstuffs and ruminant 's milk using an easy and simple LC-MS / MS multiresidue method. Talanta. 2014;130: 8-19.
[50] Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Text with EEA relevance).