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Determination The Residual Amounts Of Anthelmintic Substances In Livestock Products By Immunomicrochip Analysis.

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ABSTRACT

The article shows the promise of an immunomicrochip method for determining residual anthelmintic quantities in the meat of various animal species.

Keywords: immunomicrochip method, nano-biotechnology, anthelmintic drugs, meat products, toxicants.

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INTRODUCTION

In the countries of the European Union (EU), in accordance with Directive 96/23 / EC [7], the residual content in the feed and animal products of prohibited substances of Groups A and B, which include anthelmintic preparations, is regularly monitored.

As it is known, at present there is a fairly wide range of antiparasitic drugs on the veterinary market, containing salicylanilides, pyrethroids, carbamates, organochlorine compounds, etc., as an active principle. This is due to the fact that preparations based on avermectins have a wide spectrum of antiparasitic action at relatively low concentrations, the generally accepted therapeutic dose is 200 µg / kg body weight [5].

The use of anthelmintic drugs significantly improves the state of animal husbandry, however, effective monitoring is necessary to prevent the presence of residual quantities in milk and meat, as this may have an impact on health for consumers.

There are many methods for determining the residual amounts of anthelmintic drugs. These methods must be very accurate since the definition of micro-doses of drugs is required.

To determine the residual amounts of anthelmintic used methods HPLC, colorimetric method AAS, the method of one-stage competitive enzyme immunoassay [1, 2, 4].

One of the innovative directions in this field are methods based on nano-biotechnology and, in particular, the immunochip method, designed for the simultaneous qualitative and quantitative evaluation of several substances by one sample. It is based on the patented Randox® Biochip technology, which is a solid-phase carrier with test zones placed on it in a specific order, on which antibodies specific for various antigens (antihelminthic and antimicrobial preparations) are immobilized.

Since the development and adaptation of methods for detecting residual amounts of anthelmintic in products of veterinary and sanitary inspection based on immunochip technology is quite relevant, it has become the goal of our research [3, 6].

MATERIALS AND METHODS

For carrying out the experiments, samples of meat products were selected from the trading network and examined; in total, 39 samples were examined.

The residual amounts of anthelmintic preparations were determined by the method of immunochip technology in accordance with the instruction from Randox Laboratories Ltd, February 06, 2007 (United Kingdom) to the semi-automatic scanning chemiluminometer Evidence investigator and instructions to the Anthelmintics Array test system. To determine the residual amounts of anthelmintic drugs used set Anthelmintics Array.

RESULTS AND DISCUSSION

At the first stage of our work, the sensitivity of the chosen method was determined. For this, different doses of anthelmintic substances were artificially added to samples of meat products. The results are presented in table 1.

Table 1: The limit of detection of anthelmintic substances test system Anthelmintics Array in meat

Analyst	Detection limit stated by the manufacturer, µg / l	Detection limit, experimentally determined, µg / l
Benzylamidazole	1,0	1,03±0,09
Aminobenzoamidazole	0,15	0,13±0,04
Levamisole	6,5	6,43±0,09

Averomiktin	0,75	0,71±0,08
Tiabendazole	1,2	1,13±0,06
Moxidectin	1,6	1,58±0,04
Triclabenzadol	0,8	0,81±0,03

At the next stage, the specificity of the immunomicrochip method was established. Anti-helminth substances from different groups were introduced into the beef sample, as well as veterinary anthelmintic drugs used in the Russian Federation for treatment and analyzed using the Anthelmintics Array test system. The data obtained are presented in tables 2 and 3.

Table 2: Determination specificity of the immunemicrochip method for anthelmintics contained in meat when making anthelmintic drugs in it

Meat samples with the introduced doses of anthelmintics	Determined anthelmintics						
	BenzyImidazole	Aminobenzamidazole	Leva-Mizol	Averomiktin	Tiabendazole	Moxidectin	Triclabenzadol
Albendazole 2-amino sulphone	-	+	-	-	-	-	-
Amino-flubendazole	-	+	-	-	-	-	-
Amino-mebendazole	-	+	-	-	-	-	-
Levamisole	-	-	+	-	-	-	-
Moxidectin	-	-	-	-	-	+	-
Thiabendazole	-	-	-	-	+	-	-
5-hydroxythiabendazole	-	-	-	-	+	+	-
Cambendazole	-	-	-	-	+	-	-
Triclabendazole (TCBZ)	-	-	-	-	-	-	+
Triclabendazole Sulphoxide	-	-	-	-	-	-	+
Keto-triclabendazole	-	-	-	-	-	-	+
Ivermectin	-	-	-	+	-	-	-
Abamectin	-	-	-	+	-	-	-
Doramectin	-	-	-	+	-	-	-
EmamectinBenzoate	-	-	-	+	-	-	-
Eprinomectin	-	-	-	+	-	-	-
Albendazole	+	-	-	-	-	-	-
Albendazolesulphoxide	+	-	-	-	-	-	-
Albendazolesulphone	+	-	-	-	-	-	-
Fenbendazole	+	-	-	-	-	-	-
Oxfendazole (Fenbendazolesulphoxide)	+	-	-	-	-	-	-
Oxibendazole	+	-	-	-	-	-	-
Mebendazole	+	-	-	-	-	-	-
Oxfendazolesulphone (Fenbendazolesulphone)	+	-	-	-	-	-	-
Flubendazole	+	-	-	-	-	-	-

Table 3: Determination specificity of the immunomicrochip method for anthelmintic drugs contained in meat when introducing anthelmintic veterinary drugs from the commercial network into it

Samples of meat with the introduced doses of anthelmintics	Determined anthelmintics						
	Benzylimidazole	Aminobenzimidazole	Leva-Mizol	Averomiktin	Tiabendazole	Moxidectin	Triclabendazol
Alvetsuspension (DV Albendazole)	-	+	-	-	-	-	-
Albendazolesuspension 10% (DV Albendazole)	-	+	-	-	-	-	-
Ivermekvet 1% sterile solution (DV Ivermectin)	-	-	-	+	-	-	-
Panakurgranulate 22.2% (DV fenbendazol)	+	-	-	-	-	-	-
Fenbendazolvet 5.5% powder (DV fenbendazol)	+	-	-	-	-	-	-
Levavet 10% sterile solution (DV Levamisole Hydrochloride)	-	-	+	-	-	-	-
Baimek 1% (DV ivermectin)	-	-	-	+	-	-	-
Ganamectin (DV ivermectin)	-	-	-	+	-	-	-
Novomek 1% (DV ivermectin)	-	-	-	+	-	-	-

"+" The presence of anthelmintic;

"-" lack of anthelmintic.

From the presented data it is clear that the panel for determining residual amounts of anthelmintic drugs Anthelmintics Array has strict specificity for the defined groups of anthelmintic substances.

CONCLUSION

In the process of research, we obtained experimental data that showed the promise of a method based on immunomicrochip technology for detecting residual amounts of anthelmintic drugs in meat products.

Using the Anthelmintics Array panel, you can determine the residual amounts of 30 anthelmintic preparations in one sample at the same time. The detection limit in meat is determined from 0.15-6.5 µg / g depending on the analyte.

The method showed high sensitivity and strict specificity. The results are given in quantitative equivalent and at the same time a large number of different anthelmintic groups, including the last generation, are determined in the sample.

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