

VOLTAMMETRIC DETERMINATION OF COCCIDIOSTAT ROBENIDINE IN ANIMAL FEED

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Coccidiostats (COCs) are widely used in veterinary medicine for the prevention and treatment of coccidiosis, especially in poultry. Coccidiosis is common protozoal disease, causing intestinal lesions, scarce weight gain, poor feed conversion and poor egg production; in its acute form, coccidiosis causes high mortality rates and results in serious economical losses in animal production. Therefore, much attention is paid to the prevention of this illness.

COCs are authorised as feed additives, according to the Regulation (EC) No 1831/2003. Feed contamination is a source of COCs residues in poultry products. Such transfer from target to non-target feed happens during the production of feed, but also during its transport and storage as well as on a farm. As a result, it can potentially cause toxic effects in non-target animals and can result in undesirable levels of COCs residues in food of animal origin. Therefore, the level of COCs in feed should be particularly monitored. With regard to robenidine (ROB) as one of COCs representatives, the Regulation (EC) No 2020/148 have authorised the use of feed with its level of 30–36 mg/kg.

The purpose of our study was to develop a method of ROB voltammetric determination in animal feed. We investigated the voltammetric behavior of ROB on a static mercury drop electrode (SMDE) and a silver solid amalgam electrode (p-AgSAE) [1]. The reduction of ROB on SMDE and p-AgSAE results in an occurrence of one cathodic peak at the potentials ca. -0.85 V and -0.94 V, respectively. The influence of supporting electrolyte, extractants, pH of the media, accumulation parameters, and scan rate were investigated.

In the study we used feed samples free from ROB (according to preliminary LC-MS/MS analysis) provided by National Reference Laboratory of Veterinary Drug Residues Control. The sample preparation procedure was as follows: different accurate amounts of ROB standard powder were added into the samples of feed depending on sample weight. Then these samples were stirred for 10 h on a vortex type mixing device. Afterwards, samples were stored in dark place at 4 °C for a week. After proper procedure of sample preparation, the final solutions were transferred by measuring pipette into an electrolytic cell. The LOQ of the methods of ROB determination in feed are 9.5 mg/kg and 2.5 mg/kg on SMDE and p-AgSAE, respectively. The accuracy was verified by the “added-found” method. The results are presented in Table 1.

Table 1. The results of ROB determination in feed (“added-found” method)

Added ROB, mg/kg	Found ROB, mg/kg		Recovery, %	
	On SMDE, <i>n</i> =5, <i>P</i> =0.95	On p-AgSAE, <i>n</i> =3, <i>P</i> =0.95	On SMDE	On p-AgSAE
17.5	19.7±0.8	–	112.57	–
18.9	18.7±0.5	–	98.94	–
19.6	19.8±0.4	19.7±0.3	101.02	100.51
40.5	40.5±0.3	40.45±0.21	100.00	99.88

Using our new voltammetric method, it is possible to accurately determine robenidine in feed in a wide content range (for large contents, the reliability of the determination is higher). The developed approach fully complies with the requirements of the Regulation (EC) No 2020/148.

[1] Ivakh S., Dubenska L., Rydchuk M., and Plotycya S. (2021). Voltammetric behavior and reliable method for the determination of coccidiostat robenidine in animal feed and poultry meat. *Electroanalysis*, 33(1), 256-267. <https://doi.org/10.1002/elan.202060225>