Regularities of ^{137}Cs transfer from food to animals

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The regularities of ^{137}Cs transfer from forage to animal body and animal products have not been clearly evaluated, yet. The research often does not consider the peculiarities of animal body and their feeding. Considering this the main objective for our research was to study the peculiarities of ^{137}Cs metabolism in the animal body according to the feeding type.

Methods

The experiments were performed on three castrated bull cafs of White-&-Black breed with a big rumen fistula using a group-and-period method.

The studies consisted of two periods: the control one (feeding animals with "clean" forage and the main one (feeding animals with contaminated forage). In the control period the animals were offered an adequate diet which consisted of: cereal hay, corn silage, concentrates and molasses. During the main period clean hay was replaced for contaminated one, the ^{137}Cs specific activity of which was 1.8 - 3 $KBq \cdot kg^{-1}$. While carrying out the experiment the forage, urine and feces were sampled, ^{137}Cs intake and excretion were calculated using the method of individual daily record of forage fed, urine and feces. At the same time average samples were taken. The specific activity of samples were calculated using on AMA- O3F analyzer. The "clean" forage experiment lasted 48 days and the contaminated forage experiment - 46 and 68 days.

Results

The ^{137}Cs continuous intake by animals results in it's steady accumulation in the animals body. However after a certain period of time the amount of radionuclide intaken balances that excreted. The periods ^{137}Cs accumulation in the animal body lasts 30 - 150 days depending on a number of factors according to the various sources. Under the continuous ^{137}Cs intake with forage (13.5 KBq per day), its most intensive accumulation in the body lasted 22 days of the experiment, which was reviled in a more activity concentration urine and feces. In that period the urine and feces specific activity increased steadily. The ^{137}Cs content dynamics may be shown in the following equations:

for urine $y=e^{5.73} t^{0.74}$ (r=0.93)

for feces: $y=e^{5.20} t^{5.20}$ (r=0.96)

A closed correlation between the urine and the feces specific activity can be described as follows:

$1/y = e^{(-0.61)} x$ (r=0.76).

During the period of the dynamic equilibrium the urine and feces activity nearly did not changed and depended only on the range of the ration activity concentration. We do not have any correlation dependence for this period (r=from -0.05 to -0.2). The average ^{137}Cs excretion was: with urine 5 - 5.5%; with feces - 39 - 45%. After we had began feeding animals with clean forage ^{137}Cs excreted intensively for 10 days. During this period the specific activity reduced on the average by 73 - 93%. The radio-cesium content dynamics is given the following equations:

for urine $y=10000/6.9+2.1t$ (r=0.93)

for feces $y=10000/16.7+2.01t$ (r=0.91)

Conclusions

The excreta' specific activity indices may be used as markers of radioactivity accumulation in the body. Besides, the value of specific activity of feces may be used as a convenient and simple method of forecasting the contamination of the animal body *in vivo*.