

## **IN-VITRO ANALYSIS OF GAS PRODUCTION IN RATIONS WITH ADDITION OF BIOLOGICALLY ACTIVE SUBSTANCES - ANIMAL AND DETOX AND FRESH AND LYOPHILIZED RUMEN FLUID**

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### **Abstract**

Livestock and especially ruminants are one of the main sources of greenhouse gases. Due to the large number of ruminants, relatively modest improvements in farm management and feeding systems may lead to significant effects in terms of reducing the generation of undesirable emissions. Such *in-vivo* research in ruminants is difficult, time-consuming and requires significant financial resources. Therefore, *in-vitro* technologies have become necessary in recent years. However, difficulties in cannulating animals at the rumen level limit the *in-vitro* studies. In order to overcome these problems, efforts are focused on the possibilities of using lyophilized rumen fluid, which was the aim of this research.

The study has been performed with rams aged 2 years of the Bulgarian Dairy Synthetic Population. The rumen contents have been taken in the morning before feeding and filtered through three layers of gauze, then frozen at  $\leq -55$  °C and lyophilized for 24 hours. Gas production in rations with the addition of biologically active substances - Animal and Detox was analyzed by using fresh and lyophilized liquid of rumen contents. The determination of the emitted amounts of carbon emissions in different feed sources is according to the methodology for analysis with the Ankom RF Gas Production System, which allows, in comparison with other "*in-vitro*" systems, for fast and representative analysis.

In the feeding ration analysis, higher values of the total amount of gases produced in fresh inoculum are found in comparison with the lyophilized at all levels of incubation. In a ration with Animal additive and a fresh and lyophilized rumen fluid with different incubation duration, a significant increase in the values of the released amount of gas is found when using fresh and lyophilized inoculum from 24 to 48th hours - 58.4% and 57.4%, respectively. After 48 hours of incubation, the differences are insignificant. The values of the total amount of gases produced in lyophilized inoculum are slightly higher than those obtained in fresh inoculum. In the comparative analysis of the feeding ration with Detox additive the results obtained are similar to those when adding Animal. The data show a significant increase in the values of the released amount of gas when using fresh and lyophilized inoculum from 24 to 48th hour - 57.7% and 57.2%, respectively. After 48 hours of incubation, the differences are insignificant.

The values of the total amount of gases produced from a feeding ration are higher when using fresh inoculum.

**Key words:** *Gas emissions, Fresh rumen fluid, Gas production, Lyophilized rumen fluid, Biologically active additives.*