

DLG-Test Report 7002

dropnostix GmbH

Rumen sensor dropnostix Sensor-Bolus

Rumen fluid resistance

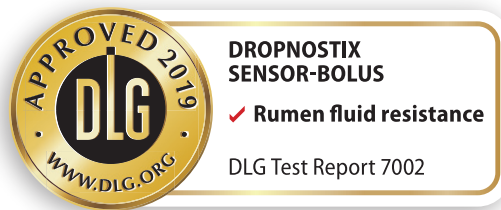


**DROPNOSTIX
SENSOR-BOLUS**
✓ Rumen fluid resistance
DLG Test Report 7002



Overview

A test mark „DLG-APPROVED for individual criteria“ is awarded for agricultural products which have successfully fulfilled a scope-reduced usability testing conducted by DLG according to independent and recognised evaluation criteria. The test is intended to highlight particular innovations and key criteria of the test object. The test may contain criteria from the DLG test scope for overall tests, or focus on other value-determining characteristics and properties of the test subject. The minimum requirements, test conditions and procedures as well as the evaluation bases of the test results will be specified in consultation with an expert group of DLG. They correspond to the recognised rules of technology, as well as scientific and agricultural knowledge and requirements. The successful testing is concluded with the publication of a test report, as well as the awarding of the test mark which is valid for five years from the date of awarding.



In this test, the resistance of the materials of a rumen sensor housing to artificially produced rumen fluid was tested in the laboratory on the basis of DIN EN ISO 175. The DLG test framework for rumen sensors, status 2014, was used as the basis for this. No other criteria were investigated.

Assessment in brief

The rumen sensor ‘dropnostix Sensor-Bolus’, a two-piece special bolus for cattle with an internal battery and sensors for measuring the temperature, movement and digestive activity, was investigated as regards its resistance to rumen fluid in a laboratory test under physiological and acidosis

conditions in the DLG-APPROVED for individual criteria test. The materials used for the rumen sensor housing, including the adhesive, proved to be resistant under all of the test conditions. Fluid ingress was not observed on any of the test samples.

Table 1:
Result overview

Test characteristic	Test result	Evaluation*
Rumen fluid resistance at physiological 40 °C		
– demineralised water (reference)	resistant	+
– Rumen fluid, physiological, pH 6.0	resistant	+
– Rumen fluid, acidosis case, pH 5.2	resistant	+
Rumen fluid resistance at accelerating 60 °C		
– demineralised water (reference)	resistant	+
– Rumen fluid, physiological, pH 6.0	resistant	+
– Rumen fluid, acidosis case, pH 5.2	resistant	+

* Evaluation range: – = not resistant (deviations compared to new condition > 5 %); + = resistant (deviations < 5 %)

The Product

Manufacturer and applicant

dropnostix GmbH, Geschwister-Scholl-Straße 51, 14471 Potsdam, Germany

Product:

Rumen sensor 'dropnostix Sensor-Bolus'

Contact:

Phone +49 (0)331 58291-430

mail@dropnostix.com www.dropnostix.com

Description and technical data

The tested rumen sensor 'dropnostix Sensor-Bolus' is a two-piece special bolus, one half of which is made of stainless steel and the other half of which is made of POM (polyoxymethylene). The two halves are bonded and pressed together leak-tight using a hybrid adhesive. The 3 cm chip and a battery, which has a lifetime of at least four years according to the manufacturer, are located inside the bolus.

The rumen sensor is administered orally to the animals and remains in the rumen until they are slaughtered.

The rumen sensor is used to continuously register digestive activity and the temperature in the rumen as well as the movement activity of cattle, particularly

dairy cows. The data are evaluated and processed using software so that the health of the animals can be observed and forecast as part of a monitoring system. This enables the livestock owner to respond to changes early on.

Table 2:

Technical data

Rumen sensor	
Length	110.4 mm
Diameter	36.0 mm
Colours	Silver metal, white plastic
Weight (with electronics)	265 g

The Method

Test media

The artificial rumen fluid is used to simulate the chemical-physiological conditions in the rumen.

It consists of a buffer solution which simulates the 'rumen saliva' as well as a solution of mass and trace elements to imitate the osmotic conditions in the rumen mucosa, amongst other aspects.

The artificial rumen fluid contains no microorganisms, but does contain their natural reaction products. A fatty acid mixture was used to adjust the pH of the solution to the physiological value of 6.0.

In addition to the physiological conditions, the case of ruminal acidosis was tested as the worst case scenario. To do this, the pH value of the artificial rumen fluid was reduced to 5.2 using lactic acid. In practice, a cow with a rumen pH value of less than 5.2 would no longer be alive.

Demineralised water was used as the reference solution for all of the conditions that were investigated.

Rumen fluid resistance test

The test was conducted as a static immersion test in the laboratory. Three test samples each were completely covered with the respective test media and stored in the heating cabinet for four weeks in covered containers. This was done at

- 40 °C corresponding to the physiological conditions in the rumen and
- 60 °C to accelerate the material test and the assessment of the results.

The test solutions were renewed each week.

Prior to the immersion test, the rumen sensors were visually assessed and their weight and material thicknesses were measured. The Shore D hardness was additionally measured on the plastic part. Following the immersion test, the test samples were rinsed with demineralised water, dried for 48 hours at room temperature, and then measured and visually assessed again.

The changes in the test samples' characteristics as a percentage of the initial value were used to evaluate the results.



Figure 2:
Test samples in the heating cabinet

Detailed account of the test results

Table 3:
Individual results

Test characteristic	Test result			
	Diff. weight [%]	Diff. metal diam. [%]	Diff. plastic diam. [%]	Diff. Shore D [%]
Rumen fluid resistance at physiological 40 °C				
– Demineralised water (reference)	< 0.1	< 0.1	< 0.4	< 0.1
– Rumen fluid, physiological, pH 6.0	< 0.1	< 0.1	< 0.4	< 0.1
– Rumen fluid, acidosis case, pH 5.2	< 0.1	< 0.1	< 0.4	< 0.1
Rumen fluid resistance at accelerating 60 °C				
– Demineralised water (reference)	< 0.1	< 0.1	< 0.6	< 0.1
– Rumen fluid, physiological, pH 6.0	< 0.1	< 0.1	< 0.6	< 0.1
– Rumen fluid, acidosis case, pH 5.2	< 0.2	< 0.1	< 0.6	< 0.1

The material changes measured after the four-week immersion test were all less than 1 % and were therefore very minor.

Visual changes, e.g. in the colour, and signs of corrosion were not observed.

The materials used for the rumen sensor housing, including the adhesive, are therefore considered to be resistant to rumen fluid.



Figure 3:
Test samples after the immersion test, example

Summary

In this test, the housing of the rumen bolus ‘dropnostix Sensor-Bolus’ was investigated as regards the criterion of rumen fluid resistance on the basis of a four-week immersion test in artificial rumen fluid.

The product meets the requirements of the DLG test framework for the investigated criterion.

More information

Testing agency

DLG TestService GmbH,
Gross-Umstadt location

The tests are conducted on behalf of DLG e.V.

DLG test framework

Rumen sensors (current as of 2014)

Department

Agriculture

Head of Department

Dr. Ulrich Rubenschuh

Test engineer(s)

Dipl.-Ing. agr. Susanne Gäckler*

* Author

DLG – the open network and professional voice

Founded in 1885 by the German engineer Max Eyth, DLG (Deutsche Landwirtschafts-Gesellschaft – German Agricultural Society) is an expert organisation in the fields of agriculture, agribusiness and the food sector. Its mission is to promote progress through the transfer of knowledge, quality standards and technology. As such, DLG is an open network and acts as the professional voice of the agricultural, agribusiness and food sectors.

As one of the leading organisations in the agricultural and food market, DLG organises international trade fairs and events in the specialist areas of crop production, animal husbandry, machinery and equipment for farming and forestry work as well as energy supply and food technology. DLG's quality tests for food, agricultural equipment and farm inputs are highly acclaimed around the world.

For more than 130 years, our mission has also been to promote dialogue between academia, farmers and

the general public across disciplines and national borders. As an open and independent organisation, our network of experts collaborate with farmers, academics, consultants, policymakers and specialists in administration in the development of future-proof solutions for the challenges facing the agriculture and the food industry.

Leaders in the testing of agricultural equipment and input products

The DLG Test Center Technology and Farm Inputs and its test methods, test profiles and quality seals hold a leading position in testing and certifying equipment and inputs for the agricultural industry. Our test methods and test profiles are developed by an independent and impartial commission to simulate in-field applications of the products. All tests are carried out using state-of-the-art measuring and test methods applying also international standards.

Internal test code DLG: 2019-158

Copyright DLG: © 2020 DLG



DLG TestService GmbH
Groß-Umstadt location

Max-Eyth-Weg 1 • 64823 Groß-Umstadt • Germany
Phone: +49 69 24788-600 • Fax: +49 69 24788-690
Tech@DLG.org • www.DLG.org

Download of all
DLG test reports free of charge
at: www.DLG-Test.de