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Integrating Activities for Starting Communities



SmartCow: an integrated infrastructure for increased research capability and innovation in the European cattle sector



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EXECUTIVE SUMMARY

<p>Background</p>	<p>In the frame of SmartCow project, WUR-DLO has made access it Research Installation “Dairy Campus” through Trans National Access (TNA).</p>
<p>Objectives</p>	<p>This Deliverable aims at describing the TNA provided by WUR-DLO during the SmartCow project.</p>
<p>Methods</p>	<p>The Deliverable is composed of a table summarising the TNA provided by the Research Installation (RI) and by the reports of activities provided by the TNA users who accessed this RI.</p>

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1 TNA provided

Name of the TNA project	Name of TNA user	Organisation of TNA user	Country of TNA user	Installation from the RI	Start date	End date	Number of units of access provided
Effects of Bacillus probiotic on productivity, health and welfare of dairy cows	Toshihiro Marubashi / Nakamura	Calpis	United Kingdom	Dairy Campus	18/06/2020	31/10/2020	896

2 Final reports of the each TNA provided

2.1 TNA 1

Calsporin® is a zootechnical feed additive based on viable spores of *Bacillus subtilis* C-3102, approved in the EU for several target animal categories, but not yet in dairy cattle. The objective of this study is to evaluate the efficacy of Calsporin® in dairy cows, on feed intake and milk production. Rumen fluid samples and faeces were analysed to gain insights about the effect of fermentation and digestion.

A total of 64 multiparous Holstein Friesian dairy cows were enrolled in a study with a 15 day pre-period and a 105 day study period. After the pre-period, the cows were approximately 60-160 days in lactation and allocated to one of two treatments: T0 Control and T1 Calsporin, 32 cows per treatment. Both groups were balanced for parity, days in lactation and milk yield. Cows in group T1 Calsporin received the Calsporin® product delivering 3×10^9 CFU/cow/day. Cows in group T0 Control received an identical diet, without added Calsporin®. Individual feed intake and milk production were registered daily, while milk composition was determined weekly.

The study was executed in the summer period with a period of high outside temperatures between 30-35°C resulting in some heat stress for all animals, with a temporary decrease in feed intake and milk production. Overall, milk yield was 0.7 kg/d higher for cows in the T0 Control group, but after correction for energy, fat or fat and protein content, milk yield was equal for both groups. Total dry matter intake was also equal in both groups and on average 24.5 kg/d. Feed efficiency as expressed by kg of corrected milk per kg of dry matter intake was on average 1.5 kg/kg and did not differ between the two treatments.

Calsporin® in the diet affected the rumen volatile fatty acids concentrations significantly, relatively more acetic acid (+2.1%) and less propionic (-2.7%) and valeric acid (-0.3%) compared to the control diet. Ammonia concentration in rumen fluid did not differ between treatments.

Faecal digestibility was measured by using an inert marker supplemented via the diet. The composition of the faeces and fibre digestibility was influenced by the treatment. Fibre digestibility (NDF, ADF as well as hemicellulose and cellulose) increased significantly by T1 Calsporin treatment, up to 5%.



Microbiota profiling of rumen fluid samples showed differences. Listing of dominant bacteria and archaea at phylum, family and genus levels in samples taken at three time points were influenced by the treatments applied.

Based on the taxonomic abundance profiles of the bacterial-dominated microbiome (16S v5v6 region) of the different samples, rumen fluid samples collected at three time points from cows fed the control diet or Calsporin based diet showed significant difference in bacterial community composition for time and treatment. However, the taxonomic abundance profiles of the microbiome dominated by archaea (16S v1v3 region) showed significantly different bacterial community composition only in the treatment.

In conclusion, under the present circumstances, the addition of Calsporin® did not positively nor negatively affect performance in early- to mid-lactating dairy cattle. However, by feeding this feed additive, fibre digestibility improved, and substantial differences occurred in rumen fatty acids and microbiota profile.