Conclusion and Implications
Taken together, the observed performance increase of the blend of cinnamaldehyde and thymol is supported by several traits like antimicrobial activity, the development of superior gut barrier integrity and the stronger innate immunity.

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O132 Food industry leftovers slightly affect gut microbiota and blood metabolites in pigs

M. Tretola [a,b], A. Luciano [a], M. Manoni [a], M. Ottoboni [a], L. Pinotti [a]

[a] University of Milan, Department of Veterinary Medicine and Animal Sciences, Lodi, Italy
[b] Agroscope, Posieux, Switzerland

Keywords: Sustainability; Food leftover; Food security; Gut health; Alternative feed ingredients

Introduction
Worldwide, the amount of wasted food is around 1.3 billion tons per year (McGuire et al., 2015). At the same time, by 2050 the sustenance demand is expected to increase significantly. The recovery of food loss as animal feed addresses both waste reduction and zero-hungry challenges. Food industry leftovers, also called former foodstuff products (FFPs) can be divided into two main categories: sugary confectionary FFPs (FFPs-C) and salty FFPs from bakery production (FFPs-B). The present study intends to increase the knowledge about the impact of both FFPs-C and FFPs-B included in growing pig's diet on the large intestinal microbial community composition and biodiversity, together with their metabolic status.

Material and Methods
Thirty-six post-weaning female piglets (Large White × Landrace) with a body weight (BW) of 8.52 ± 1.73 kg were randomly assigned to a standard diet (CTR), or diets in which traditional ingredients were partially replaced by the 30% inclusion (w/w) FFPs-C or FFPs-B diets for 42 days. Growth performance and feeding behaviour were measured.
The fecal samples were collected from the rectal ampulla after 42 days of the three experimental diets feeding and the variable regions V3 and V4 of the 16S rRNA were sequenced as described in Girard et al. (2021).
Blood serum samples (100 μL) were collected at day 0 and 42 and analyzed by UHPLC/MS-MS in ionization mode to quantify serum metabolites.
All data analyses for microbiota evaluation were performed in R (v 4.0.5) as described in Girard et al. (2021). Data about serum metabolites were analyzed through the software MetaboAnalyst (version 5.0).

Results and Discussion
The three diets did not evidence any effect ($P > 0.05$) on live animals in terms of growth performance. No differences ($P > 0.05$) were found in ADG, ADFI, and FCR. The three diets met NRC conditions, were isoenergetic and isonitrogenous. The FFPs-B diet had a lower content of NDF compared to CTR and FFPs-C. As expected, the content of simple sugar was higher in the FFPs-C diet compared to CTR and FFPs-B.
Diets did not affect the gut microbial community at the family level. No significant differences ($P > 0.05$) in the analyzed alpha diversity indexes have been observed between groups. No differences were observed in both Unweighted (PERMANOVA, $P = 0.16$) and Weighted beta diversity between groups (PERMANOVA, $P = 0.23$). Different bacteria as potential biomarkers between the three groups have been identified. A total of 104 metabolites have been quantified. Among those metabolites, several were influenced by the age of the animals. However, only two were significantly affected by the interaction between the diet and the time (Table 1). Specifically, the sugary FFP-C diets strongly increased ($P < 0.001$) both the serum concentration of the theobromine and caffeine compared to the CTR and salty FFP-B diets. Theobromine and caffeine are compounds contained in chocolate products. Theobromine has been found to affect body weight gain as well as lipid and glucose metabolism (Camps-Bossacoma et al., 2021). Similarly, it has been suggested that caffeine enhances lipolysis, fat oxidation, and reduces lipogenesis (Harpaz et al., 2017). No significant correlations between blood metabolites and bacterial taxa have been found.

Table 1
Selected serum metabolites quantified in pigs fed the three experimental diets. Values are expressed as arbitrary units of measurements.

	CTR[1]		FFP-B[2]		FFP-C[3]		SEM	*P*-value		
Metabolites	T0	T1	T0	T1	T0	T1		Diet	Time	D × T[4]
Theobromine	59419[a]	15406[a]	31890[a]	1417364[a]	40483[a]	3133733[b]	388320	<0.001	0.01	<0.001
Caffeine	4692[a]	2658[a]	5367[a]	88451[a]	6072[a]	341337[b]	33398	<0.001	0.07	<0.001

[a.] Means within in a row with different superscripts differ significantly ($P < 0.05$).
[1] Standard diet.
[2] Salty bakery former foodstuff products (FFPs) diet.
[3] Sugary confectionary FFPs diet.
[4] Interaction between diet and time (D × T).

Conclusion and Implications
Performances, fecal microbiota, and the metabolic status of the pigs were not affected by the partial replacement of standard ingredients with salty or sugary FFPs. The study confirmed that those products can be safely used in post-weaning and growing pig diets. The effect of the FFPs-based diets for a longer feeding trial on pig physiology and product quality needs to be further investigated.

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O133 Influence of Beefplus supplementation on nitrogen balance of steers

L.R. Ferreira [a], E.O.S Saliba [a], G.S.S.C. Barbosa [b], C.I.A. Queiroz [b], C.R.M. Silva [a], A.L.C.C. Borges [c]

[a] UFMG, Belo Horizonte, Brazil
[b] UFV, Florestal, Brazil
[c] UFMG, Florestal, Brazil

Keywords: Aluminossilicates; Nutrition; Ruminants

Introduction
Beefplus is a nutritional additive made from a mineral of the aluminosilicate family, which is a green-colored metasedimentary rock rich in iron and phosphorus. Aluminosilicates have adsorptive properties, the ability to bind reversibly to ammonium, and the ability to not react with nutrients or body fluids since they are inert in the digestive system. The high affinity for water and cations can help in pH control and improve the use of nitrogen in the rumen (Mumpton and Fishman, 1977). Zeolite is an example of aluminosilicate widely used in ruminant nutrition. There are still few studies using Beefplus in animal feed and the objective of this study was to evaluate the influence of Beefplus supplementation on nitrogen balance in beef cattle.

Material and Methods
Five Nellore steers (397kg ± 32,10 kg live weight) fitted with ruminal cannulas were used in a 5 × 5 Latin square design to evaluate the influence of different levels of Beefplus supplementation (0, 0.5, 1.0, 1.5 and 2.0%, on DM basis) on nitrogen balance. The diets were elaborated with 40% of maize silage and 60% of concentrate and balanced according to BR-Corte (Valadares et al., 2016). Experimental periods consisted of 15 days, with 9 days for dietary treatment adjustment and 5 days for sample collection. During the collection period, feces from all steers were taken and weighed, twice daily. Spot urine collection was performed on the last day of the trial, four hours after feeding, during spontaneous urination. 10 mL of urine diluted in 40 mL of 0.036N sulfuric acid (0.036N H_2SO_4) was collected. Feed, leftovers urine, and fecal samples were subjected to Kjeldahl N (method 984.13; AOAC 2000) analysis. The metabolism of nitrogen compounds was determined by obtaining the nitrogen (N) ingested, urinary and fecal in gram per day (g/day). The following equations were used for the calculation of nitrogen balance and retained nitrogen in relation to absorb:

(1) Nitrogen balance = N consumed – (faecal N + urinary N)
(2) N retained/Ningested = (N retained/N Balance ingested) × 100

The effects of the Beefplus level on nitrogen balance were analyzed as a 5x5 Latin square design in SISVAR using regression.

Results and Discussion
The effect of the inclusion of Beefplus on the metabolism of nitrogen compounds is shown in Table 1. The addition of different levels of Beefplus in the diet did not influence ($P > 0.05$) metabolism of nitrogenous compounds compared to the 0% level.
The responses regarding the metabolism of nitrogenous compounds and the use of aluminosilicates have not been consistent among the studies.
In beef cattle fed with high-energy diets (<60% rumen undegradable protein (RUP) and <20% NDF), zeolite supplementation (2.5%) did not affect the metabolism of nitrogen compounds (Cole et al., 2007). However, in lambs fed a growth diet (>70% RUP and 32% NDF), zeolite supplementation (6%) increased the nitrogen balance by 3.5% (Ghaemnia et al., 2010).
These differences in the literature can be related to the different levels of aluminosilicates, different types of rock (clinoptilolite, synthetic zeolite, ammonia zeolite and etc.), and/or RUP and NDF levels. In the present study, the highest inclusion of Beefplus was 2% of the DM and the estimated average RUP was 44% and the NDF was 27%.