

1 **Evaluation of the impact of the dietary inclusion of salty and sugary**
2 **former food products on the liver and the plasma profile of pigs**
3 **through OMICS approaches**

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11 Former food products (FFPs) are industrial bakery and confectionery food leftovers no longer in-
12 tended for humans due to commercial or manufacturing defects, although being still suitable as
13 feed. FFPs have more energy, fats and sugars than cereals and have been studied in monogastric.
14 Here, we replaced 30% cereals with FFPs in growing to finishing pig diets and evaluated growth
15 performance, meat quality, and impact on metabolism. Thirty-six Swiss Large White male pigs
16 were assigned to three groups (12 animals/group): i) CTR, control diet (cereals); ii) SA, 30% ce-
17 reals replaced with salty FFPs; iii) SU, 30% cereals replaced with sugary FFP (SU). The trial lasted
18 around 110 d from growing phase (22.4±1.7 kg, 60±3.8 d) to slaughter (110±3 kg, 159±7.42 d),
19 with growth performance monitored throughout. Liver tissue and blood samples were collected at
20 the end and nano-LC HR-MS-MS was applied on liver proteome (6 samples/group, 18 samples in
21 total) and plasma peptidome (1 sample/animal, 36 samples in total) to assess the potential meta-
22 bolic impact of FFPs. Growth performance was analysed with MIXED procedure by SAS soft-
23 ware. Meat quality, fatty acid profile and sensory data (1 sample/animal, 36 samples in total) were
24 analysed by ANOVA after checking normality and homoscedasticity using R software. For omics
25 data, MaxQuant software was used to process raw data and Perseus software for data interpreta-
26 tion. Results were statistically significant when $P < 0.05$. FFP-fed pigs showed no difference in
27 growth performance compared to CTR group. The SA and SU diets slightly modulated muscle
28 and backfat fatty acid profile as well as meat sensory traits, but meat quality was not altered. The
29 SA and SU diets significantly upregulated ($\log_2 FC > 0.57$) and down-regulated ($\log_2 FC < -0.57$) a
30 limited number of proteins (125 out of 2881) mostly related to lipid metabolism and cell structure
31 with no metabolic interaction among them, indicating a limited impact of FFPs diets on liver func-
32 tion. Plasma peptidomes were not significantly different among groups, although three peptides
33 related to vascular homeostasis and anti-hypertension were exclusively identified in the SA group,
34 suggesting a potential self-regulating response to face the higher Na content of the SA diet. Over-
35 all, FFPs inclusion was safe for pig welfare, with no unintended effect on metabolism, thus sup-
36 porting the idea of a wider application of FFPs as feed ingredients to reduce feed-food competition
37 and food waste.

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