

Effects of a Phytogenic Feed Additive (PFA) on the performance and apparent prececal nutrient digestibility of growing broilers

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Introduction

- The use of antibiotic growth promoters in livestock feeding is meanwhile banned in the European Union since 2006
- Phytogenic Substances have been evaluated as reasonable alternatives
- The Phenolic essential oils Cinnamaldehyde, Thymol and Eugenol induce the Nrf2-pathway which in turn up-regulates the gene expression of major intestinal amino acid- and small peptide-transporters [1]
- Saponins increase gene expression- and membrane association of amino acid- and small peptide transporters like PEPT1 [2]
- Capsaicin stimulates the intestinal heat- and pungent-sensitive Ca-channel TRPV1, followed by serotonin release and the secretion of pancreatic digestive enzymes [3]

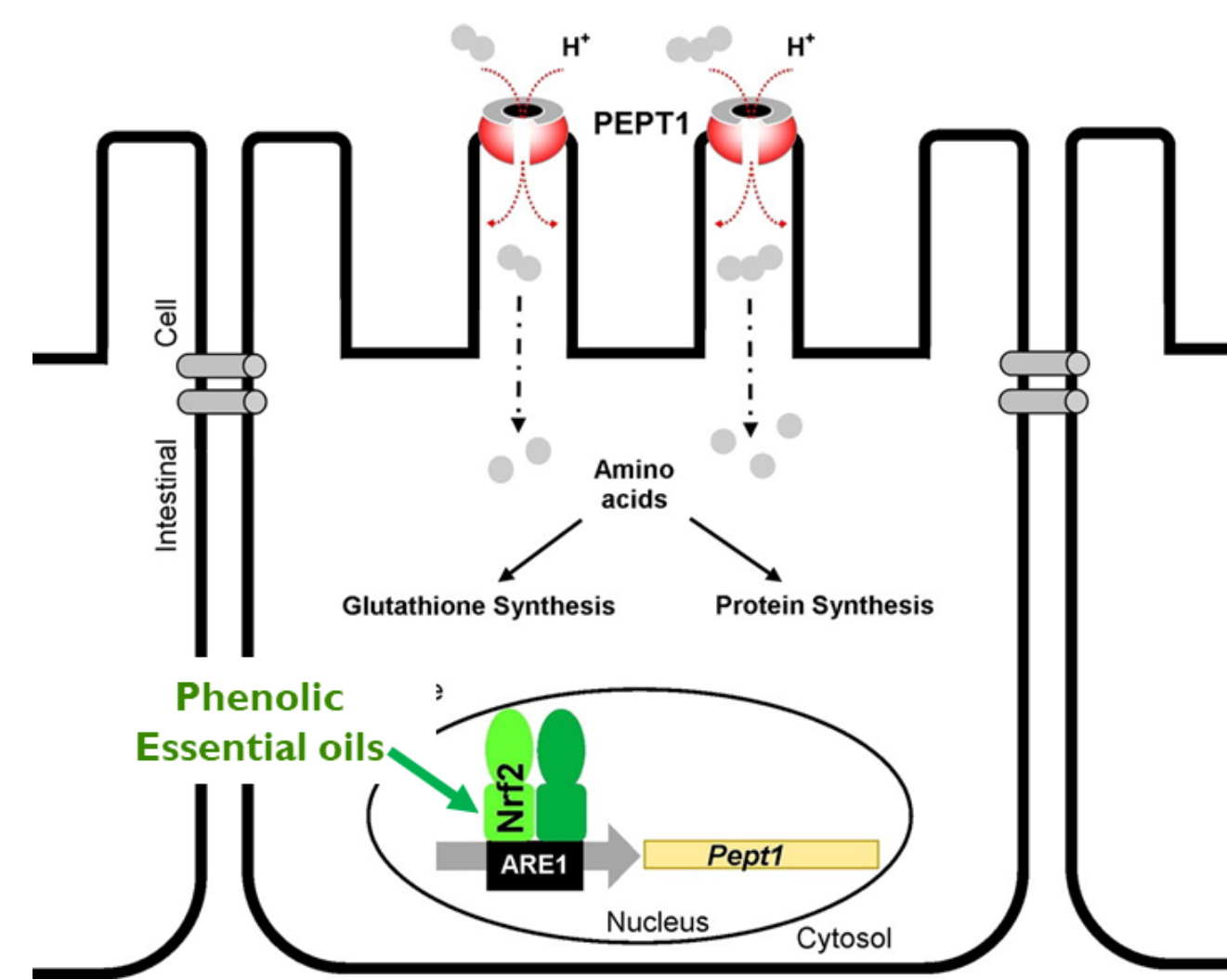


Figure 1: Phenolic Essential Oils stimulate PEPT1 Expression via the Nrf2-Pathway [1]

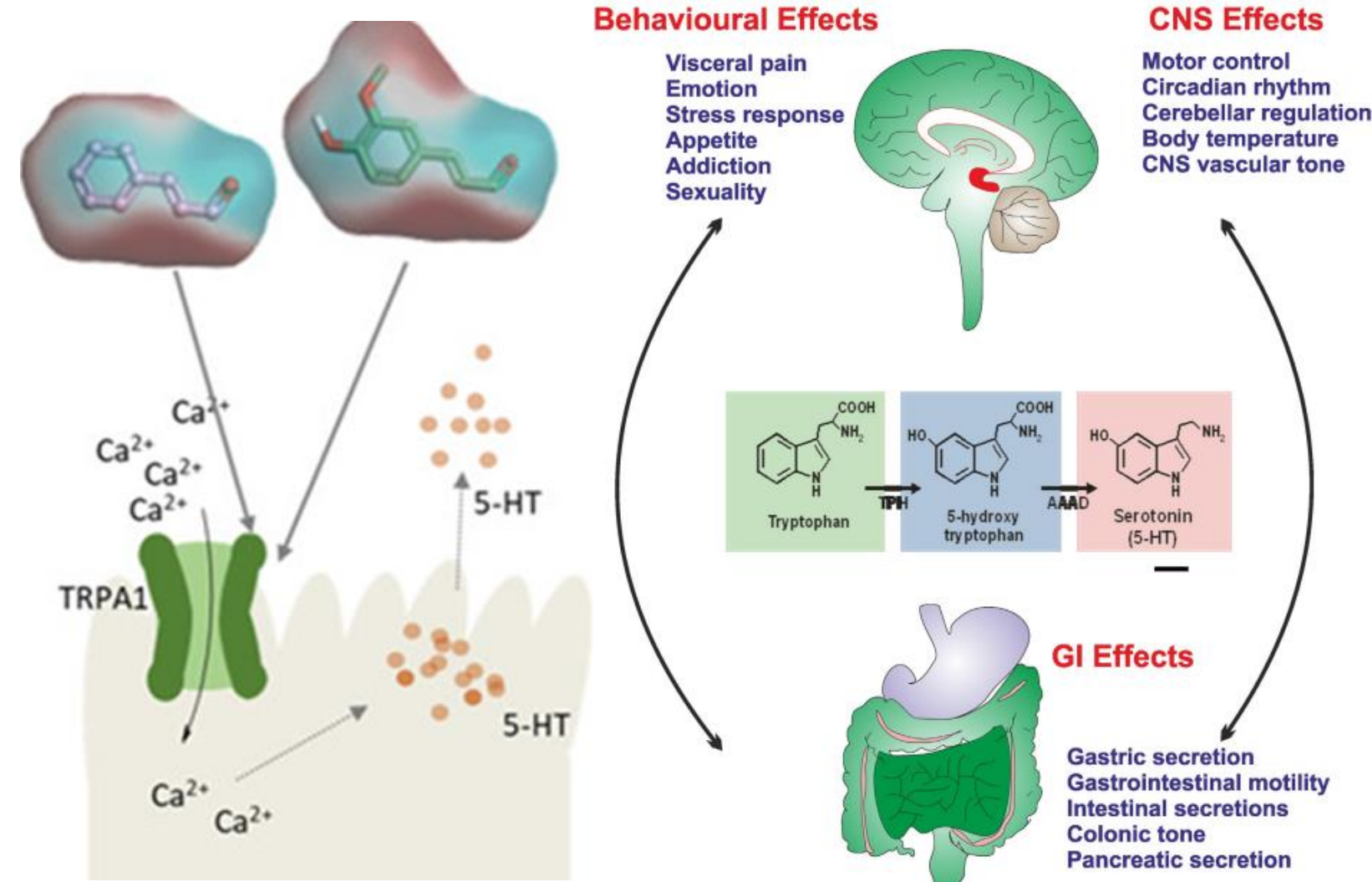


Figure 2: TRPA1 Stimulation by Capsaicin activates Serotonin release in intestinal cells, followed by pancreatic digestive enzyme release [3]

- Thus, the aim of the present study was to test the efficacy of a combination of encapsulated essential oils (Cinnamaldehyde, Thymol, Eugenol), Capsaicin, and mixed triterpene- and steroid saponins on growth performance and prececal nutrient digestibility of growing broilers

Materials and Methods

Negative Control (NC)	PFA (150 mg/kg)
18 Cobb 500 male Broiler Chicken	18 Cobb 500 male Broiler Chicken

Figure 3: Design of the 21 days lasting controlled feeding experiment, starting with one day old Cobb 500 broiler chickens

Study of

- Growth Performance for 21 days; Prececal Nutrient Digestibility at day 21

Statistics

All performance and diarrhea (health) parameters were analyzed by a one-way ANOVA using the software package SPSS (IBM SPSS Version 21)

Results

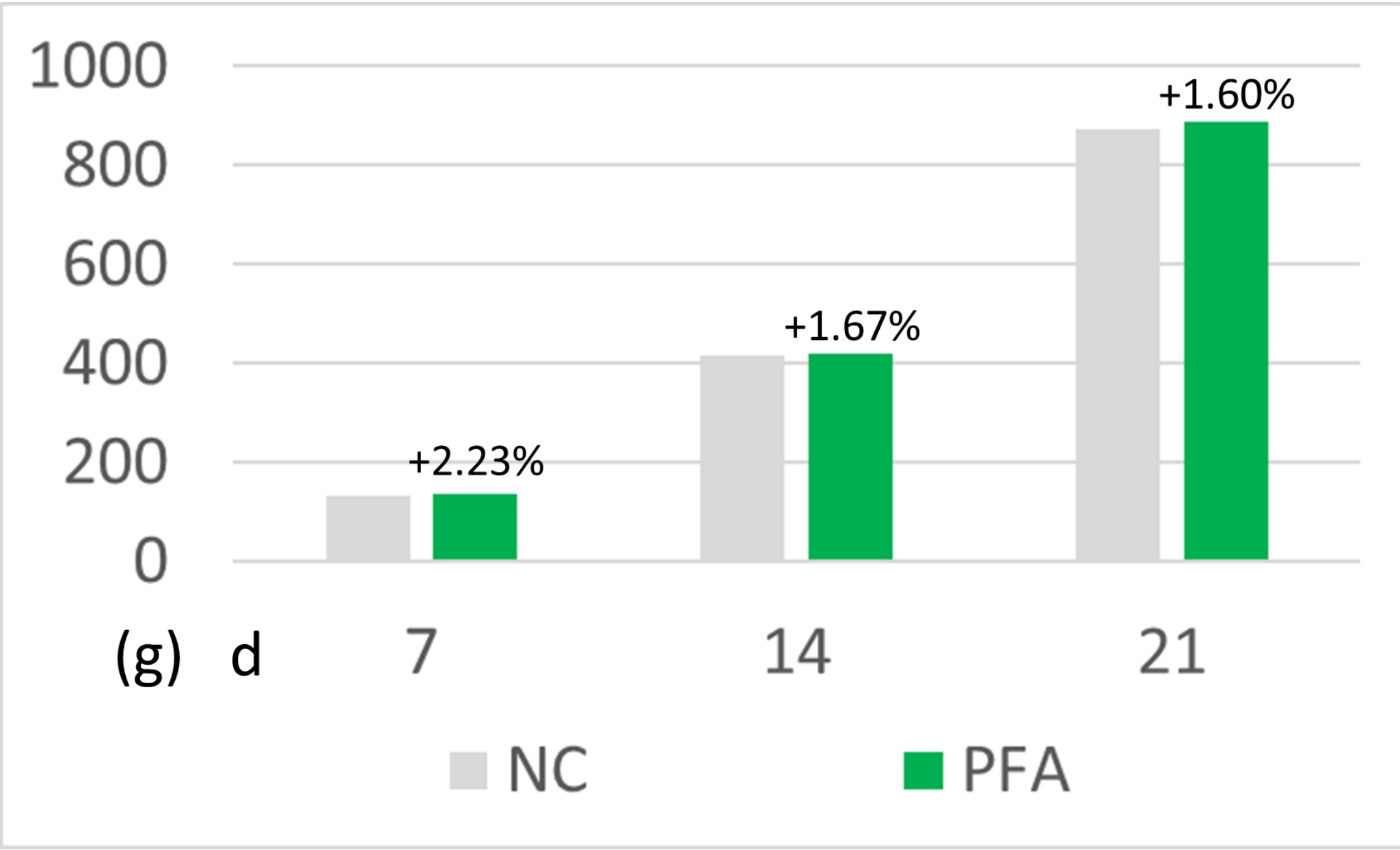


Figure 4: Body weight of growing broilers supplemented with a PFA compared to non-supplemented littermates (NC) on days 7, 14 and 21 on experiment

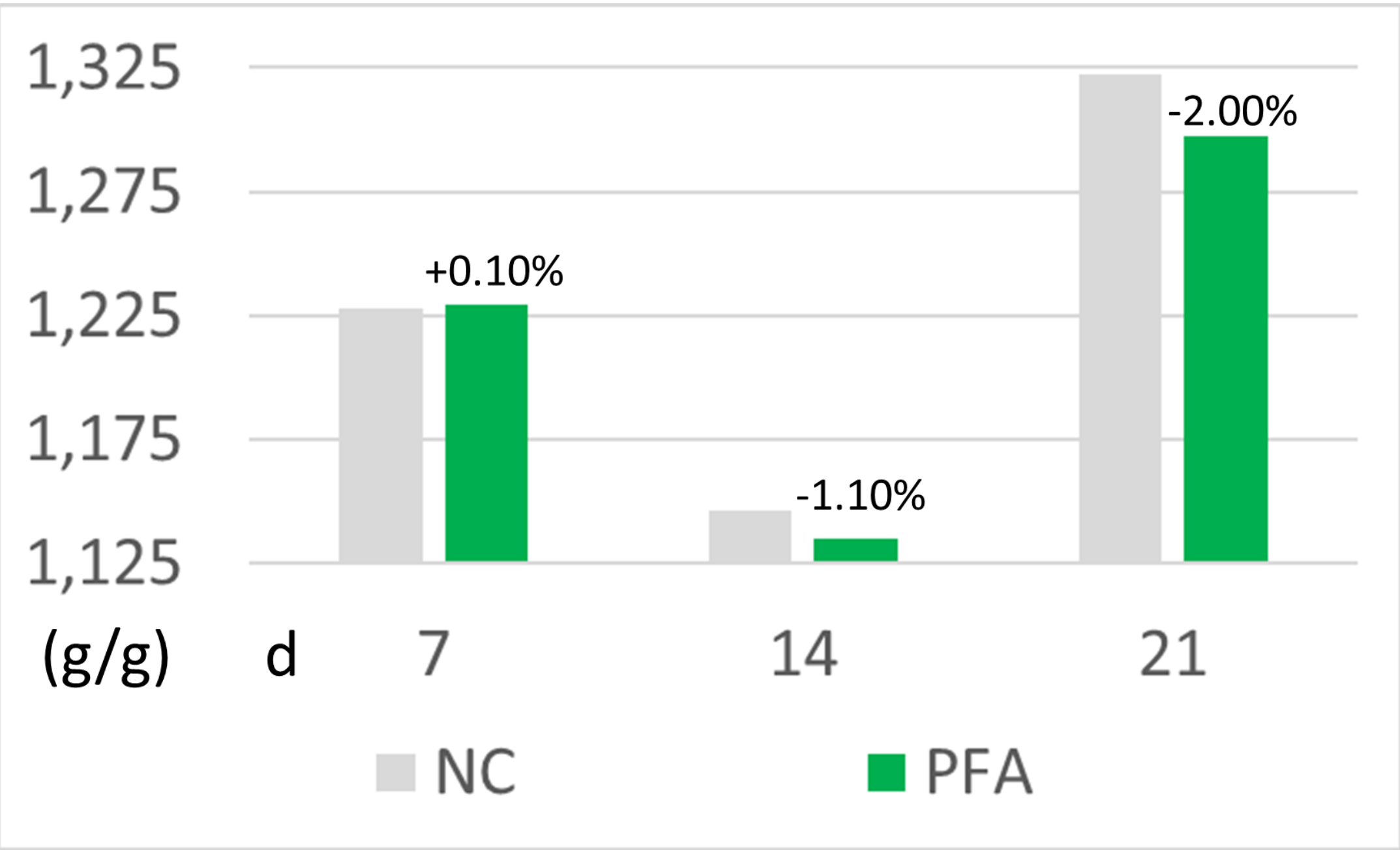


Figure 5: FCR of growing broilers supplemented with a PFA compared to non-supplemented littermates (NC) on days 7, 14 and 21 on experiment

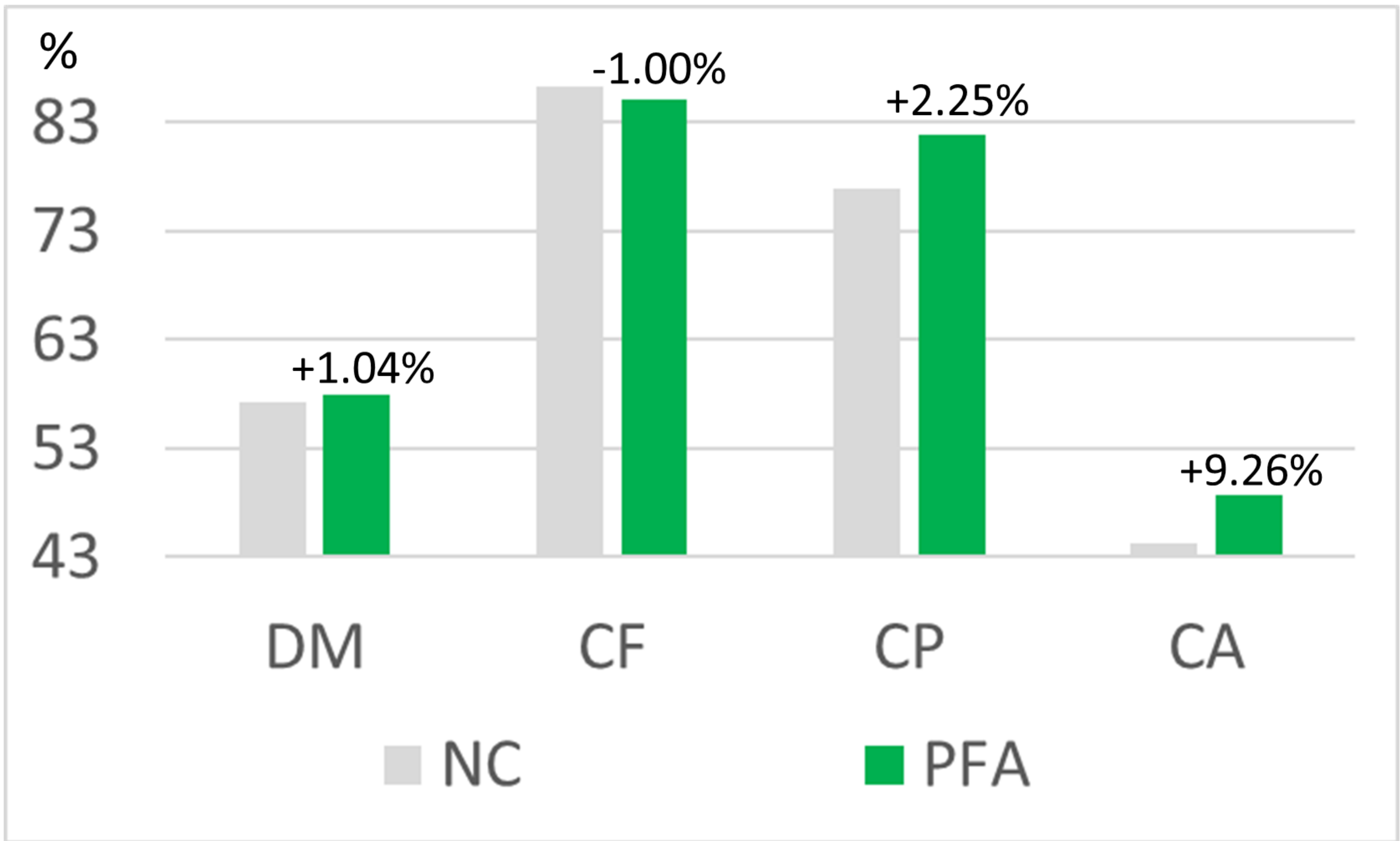


Figure 6: Apparent prececal crude nutrient digestibility of growing broilers supplemented with a PFA compared to non-supplemented littermates (NC) on day 21 on experiment

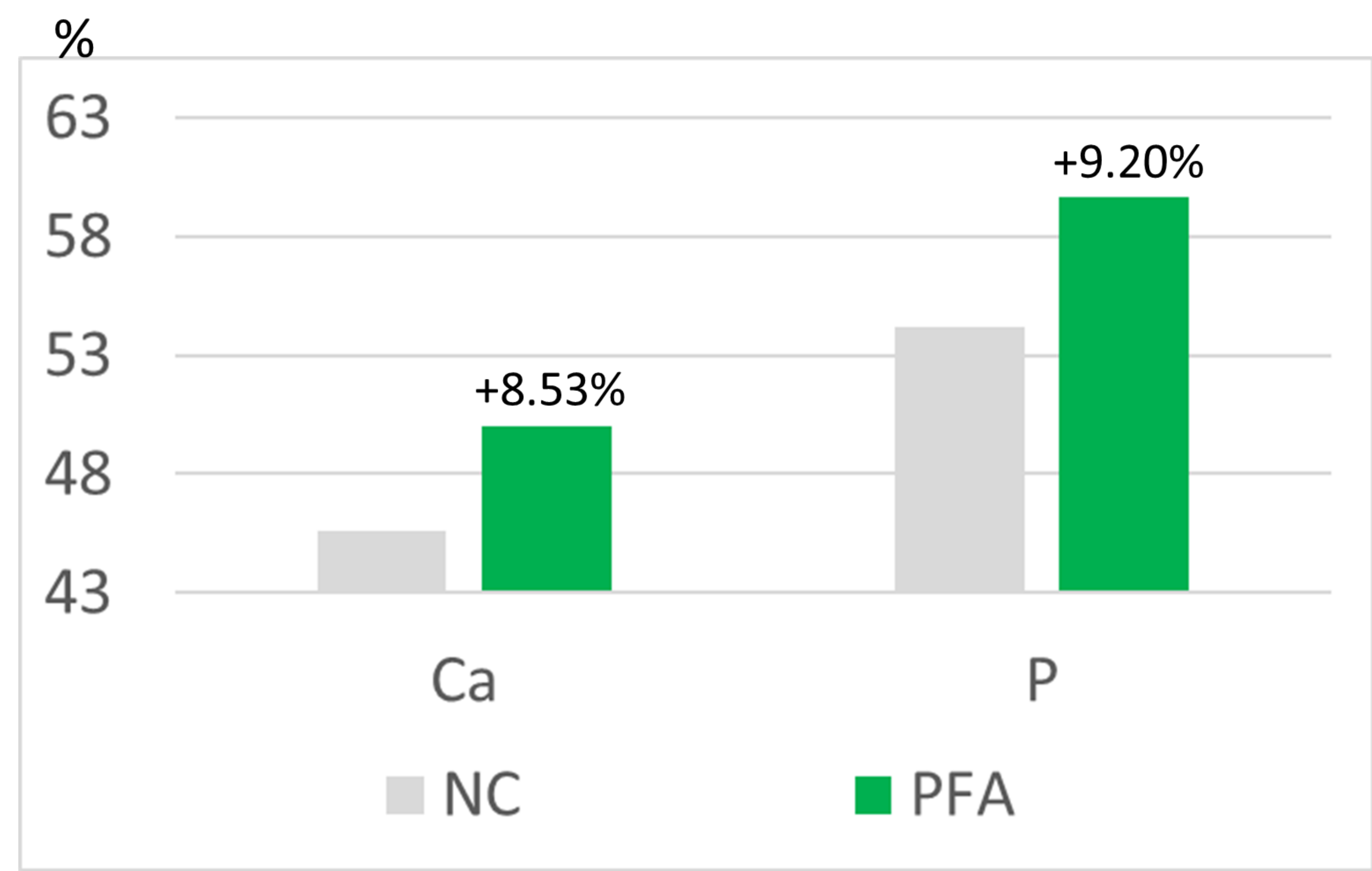


Figure 7: Apparent prececal Ca- and P- digestibility of growing broilers supplemented with a PFA compared to non-supplemented littermates (NC) on day 21 on experiment

Discussion and Conclusions

- The present study has demonstrated that PFA can play an important role as non-antibiotic growth promoters, and their efficacy largely depends on the selection and combination of single phytogenic ingredients.
- The particular strong effects of the tested PFA on apparent prececal protein-, ash-, Ca- and P digestibility can be explained by the influence of the ingredients on the above mentioned physiological pathways.

References

[1] GEILINGER K., KIPP A., SCHINK K., ROEDER P., SPANIER B., DANIEL H. (2014) Biochim Biophys Acta 1840: 1747-1757  
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[3] PINGLE S., MATTA J., AHERN G. (2007) Handb Exp Pharmacol. 179: 155-171