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EFFECTS OF PRE- OR POSTNATAL DIETARY PHYTOADDITIVE (*ECHINACEA PALLIDA*) ON GROWING RABBIT'S PERFORMANCES, CARCASS CHARACTERISTICS AND IMMUNITY

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ABSTRACT

Echinacea pallida (EP), with immunomodulation and anti-oxidative properties, was selected to study the effects on performances, carcass characteristics and immunity. Twenty mature Grimaud does were randomly divided into two groups of ten which were fed a commercial basal diet without integration of EP (untreated does, C) or with 0.3 mg/kg of EP (treated does, E) for 96 days from 98 days of age. At second parturition, eighty kittens (35-day-old) from 194-day-old does were randomly separated into four groups of twenty and fed a growing commercial basal diet with (with 0.3 mg/kg of EP) or without the integration as follow: CC (basal diet from the C does), CE (treated diet from the C does), EC (basal diet from the E does) and EE (treated diet from the E does). Performances and health status were evaluated from weaning to 77 days old. At 89-day-old, ten rabbits from each group were selected for slaughter to perform carcass characteristic analyses and phagocytosis test. At 95 days of age, the remaining ten rabbits per group were treated with a vaccine against rabbit hemorrhagic disease virus. The serum were collected at 88, 102, 109, 116 and 123 days of age to evaluate specific antibody responses. Two-way ANOVA was performed (maternal and diet effect as fixed factors). In conclusion, the dietary supplementation by EP in does promoted heavier SW and higher ADG in their kittens, whereas treated diets fed to fattening rabbits, induced a decrease of SW, a higher FCR and a phagocytic activity improvement.

Keywords: Carcass characteristic, *Echinacea pallida*, Immunity, Performance, Phagocytic activity, Rabbit

Introduction

In recent years, phyto-additive have been proposed to improve the problems of the deterioration of the health of rabbits after the ban of growth promoter antibiotic and to reduce the post weaning mortality (Christaki *et al*., 2012). *Echinacea pallida* (EP) with immune-enhancement and antioxidative properties (Barnes *et al*., 2005) are selected to determine the effects on performances, carcass characteristics and immunity status as pre- and postnatal dietary supplementation in growing rabbits.

Material and methods

Twenty Grimaud does (98 days of age) were randomly divided into two groups. Does were fed a commercial basal diet without integration of EP (untreated does, C, n=10 per group) or with 0.3 mg/kg of EP (treated does, E, n=10 per group). After the second birth, 194-day-old does and their kittens were kept in the same cage till weaning at 35-day-old. Fourty weaned kittens from C does and fourty from E does, were randomly separated into four groups of twenty. Weaned rabbits were fed a growing commercial basal diet with (0.3 mg/kg of EP) or without EP integration as follow: CC (rabbits fed basal diets from C does), CE (rabbits fed added diets from C does), EC (rabbits fed the basal diets from E does) and EE (rabbits fed added diets from E does). Feeds and clean water were provided *ad libitum*. Both does and growing rabbit diets were provided by Ferrero S.p.a., feed manufacturer (Cuneo, Italy) covering the nutritional requirements for rabbits. Performance parameters and health status were recorded. Without fasting, 10 rabbits per group (89-day-old) were slaughtered and collected the carcasses traits. Before slaughter beginning, blood samples from these rabbits were collected to perform phagocytic test (adapted from Ragap *et al*., 2012). The remaining ten rabbits per group were kept to evaluate a humoral immune response by injection a vaccine against rabbit hemorrhagic disease virus with competitive-ELISA. For statistic analysis, the data were processed with two-way ANOVA with maternal effect and diets effect as fixed factors.

Results and discussion

In table 1, the dietary supplementation of EP in growing rabbit induced a high FCR during first and whole periods (P<0.05). However, pre-treated does provided the kittens with an

improvement on ADG and SW (P<0.05). No illness and death were observed. The significant decrease in mortality rate and a improvement of productive performances in rabbits (P<0.05) were observed after the oral supplementation with high dose of extracted *Echinacea purpurea* (Ahmed *et al*., 2008; Arafa *et al*., 2010). Therefore, the finding of the current study does not support the previous research but the different on supplementation, techniques and experimental design could explain unlike results. The treated diets in growing rabbits promoted a significant improvement of phagocytic activity when compared to rabbits fed the untreated diets (P<0.05). Purified glycoproteins and alkylamides from *Echinacea* plants appear to have important effects on phagocyte-stimulation (Bauer, 1998). Therefore, the glycoprotein which presented in EP, may be the cause of the consequences in our study (Barnes *et al*., 2005). However, more research studies into the function of purified active substances is still necessary.

Table 1 Effect of pre- and postnatal dietary phytoadditive (*Echinacea pallida*) on growth performances, carcass traits and phagocytic activity in growing rabbits.

Parameters	Groups				RMSE[1]	*P*-value		
	CC	CE	EC	EE		Mother	Diet	Mother*Diet
Live weight (g; n=20 per group)								
At 35 d	884.95	889.25	888.50	882.40	53.795	0.891	0.941	0.667
At 49 d	1713.45	1711.05	1744.75	1716.80	79.709	0.302	0.397	0.476
At 77 d	3031.30	2997.51	3106.58	3041.30	160.036	0.100	0.170	0.661
Growth performance in 35-49 d (n=20 per group)								
Daily feed intake (g/d)	134.65	138.32	140.24	139.97	10.609	0.131	0.475	0.408
Daily weight gain (g/d)	59.18	58.70	61.16	59.60	3.584	0.076	0.207	0.502
Feed conversion ratio	2.28	2.36	2.29	2.35	0.145	0.866	0.035	0.739
Growth performance in 49-77 d (n=20 per group)								
Daily feed intake (g/d)	175.61	177.80	181.08	181.23	10.823	0.139	0.695	0.734
Daily weight gain (g/d)	45.44	44.36	46.96	45.67	4.053	0.123	0.195	0.910
Feed conversion ratio	3.87	4.03	3.88	3.98	0.303	0.733	0.062	0.685
Growth performance in 35-77 d (n=20 per group)								
Daily feed intake (g/d)	162.27	164.94	167.78	167.80	11.460	0.107	0.601	0.606
Daily weight gain (g/d)	49.92	49.03	51.58	50.21	3.112	0.044	0.108	0.725
Feed conversion ratio	3.25	3.37	3.26	3.34	0.190	0.822	0.019	0.705
Carcass traits (n=10 per group)								
Slaughter weight (SW, g)	3441.61	3373.36	3636.61	3498.45	98.009	0.0001	0.002	0.267
Skin, paws and feet (%SW)	17.74	18.19	17.39	17.33	0.863	0.034	0.474	0.365
Full gastrointestinal tract (%SW)	17.18	16.83	17.22	16.90	1.487	0.911	0.482	0.964
Phagocytic activity (n=10 per group)	21.20	30.89	21.78	29.67	3.143	0.757	0.0001	0.391

[1]Root mean square error

Conclusion

In conclusion, the dietary supplementation by EP in does promoted heavier SW and higher ADG in their kittens, whereas treated diets fed to fattening rabbits, induced a decrease of SW, a higher FCR and a phagocytic activity improvement.

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