USE OF CHINESE TRADITIONAL HERBAL COMPLEX AS ANTIBIOTICS SUBSTITUTIONS IN PORK PRODUCTION

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Key word: Chinese traditional herbal medicine, immune response, serum traits

Introduction

To maintain animal health and improve growth performance, antibiotics or sulfa drugs are usually added to domestic animals diet. However, the overuse and misuse of antibiotics has been shown to lead to the development of drug-resistant bacteria, consequently, the antibiotics used become less effective, and drug residual in the meat is a threat to consumer heath.

Classic Chinese herbal medicine describes various functions to prevent and cure diseases. Many Chinese herbal medicines have been shown able to enhance immunity response (Hu, 1997; Liu et al., 1998; Kong et al., 2004), and those Chinese herbal medicines have potential for application in domestic animals diet.

Pig's diet supplemented with lactic acid bacteria had recognized positive effects. Thus, this study was investigated the effects of supplemental different levels of Chinese traditional herbal complex medicine and lactic acid bacteria on the growth performance, serum traits, immune responses and meat quality of pigs, and evaluate the feasible of antibiotics replacement.

Materials and methods

One hundred and twenty crossbred (LYD) weaned pigs, averaged body weight about 13 kg were blocked according to body weight, sex and litter origin, then randomly divided into six groups with four replicates, they are control, supplemental with 0.3%, 0.5%, 0.7% Chinese herbal complex medicine (including *salvia officinalis, ocimum spp, lonicera japonica thumb, glycyrrhizae radix* etc.), 0.5% CHM + lactic acid bacteria and antibiotics groups (chlortetracycline 100 ppm and oxytetracycline 100 ppm) (as negative control). During the experiment, feeds and water were supplied *ad libitum.* Measurement items are including growth performances, serum traits, immune responses and pork quality. Immunoglobulin G level was examined using an ELISA kit. Sheep red blood cell (SRBC) antibody titer was determined by hemagglutination test. Phytohemagglutinin (PHA) skin challenge test was injected 150 μg/mL PHA in ear skin and using a micrometer measured skin swollen degree after 48 h of PHA injection. Lipoprotein profile, total globulin and γ-globulin were determined by electrophoresis method, and then scanned by a densitometer. Blood cells counting were measured with a microcell counter. Serum cholesterol and triacyglycerol were determined by a commercial kit with a serum auto-analyzer. Carcass characteristic was measured the backfat thickness and loin-eye area; meat quality including water, pH24 value, color difference, thiobarbituric acid (TBA), metamyoglobin, meat flavonoid and panel test.

The statistic analysis system was applied to analyze the variance between groups, and the significance was determined with Duncan's multiple range test (SAS, 1998).

Result and discussion

Table 1 lists the effects of supplemental different levels of CHM on growth performance. Supplemented 0.3% CHM group in average daily gain was better than antibiotics group ($p<0.05$). Average feed intake in 0.3% and 0.7% CHM groups were higher than others groups ($p<0.05$), it imply that supplemental Chinese herbal medicine can enhance appetite. There were no significantly difference in feed/gain ratio among groups ($p>0.05$).

Table 2 displays the effects of supplemental different levels of CHM on serum traits of weaned pigs. Cholesterol in antibiotics and 0.5% CHM+lactic acid bacteria groups were lower than other groups ($p<0.05$). The triacyglycerol in 0.5% CHM and antibiotics groups were higher than the control group ($p<0.05$). White blood cells in 0.3% CHM group was the highest and significantly difference to other groups ($p<0.05$). There are no significantly difference in red blood cell and mean corpuscular among groups ($p>0.05$).

Table 3 shows the effects of supplemental different levels of CHM on immune responses of weaned pigs. The IgG level in 0.3% CHM group was higher than the control group ($p<0.05$). In PHA skin challenge test represented the CHM treatment groups were larger than the control and antibiotics groups ($p<0.05$). Total globulin in antibiotics group and 0.7% CHM groups were higher than the control group ($p<0.05$). Those results indicated that Chinese herbal medicine had positive effects on immune responses and the 0.3% group displays the best results.

Table 4 and 5 and figure 1 lists the effects of supplemental Chinese herbal medicinal on carcass

characteristics, meat quality and panel test of pigs, respectively. The CHM groups pork displayed higher Hunter a value and flavonoids than the control group (P<0.05), and CHM groups showed less odor and more acceptance than the control group (P<0.05). There are no significantly difference effects on backfat thickness, loin-eye area, pH24 value and metamyoglobin among groups (P>0.05). Thus, supplemental CHM have beneficial effects on pork quality.

Table1. Effects of supplemental various levels of Chinese herbal medicine (CHM) on growth performance of weaned pigs

Items	Control	Chinese herbal medicine			0.5%CHM+lactic acid bacteria	Antibiotics	SEM
		0.3%	0.5%	0.7%			
Initial body weight, kg	13.25	13.3	13.15	13.31	13.4	13.15	0.14
Average feed intake, kg/d	1.09^{c}	1.25^{a}	1.03^{c}	1.21^{a}	1.03^{c}	1.12^{b}	0.01
Average daily gain, kg	0.55^{ab}	0.63^{a}	0.51^{b}	0.57^{ab}	0.53^{b}	0.53^{b}	0.02
Feed/gain ratio	2.08	2.01	2.08	2.27	2.02	2.30	0.12

Mean (n=20).

^{a,b} Means in the same row with different superscript are differ significantly (P<0.05).

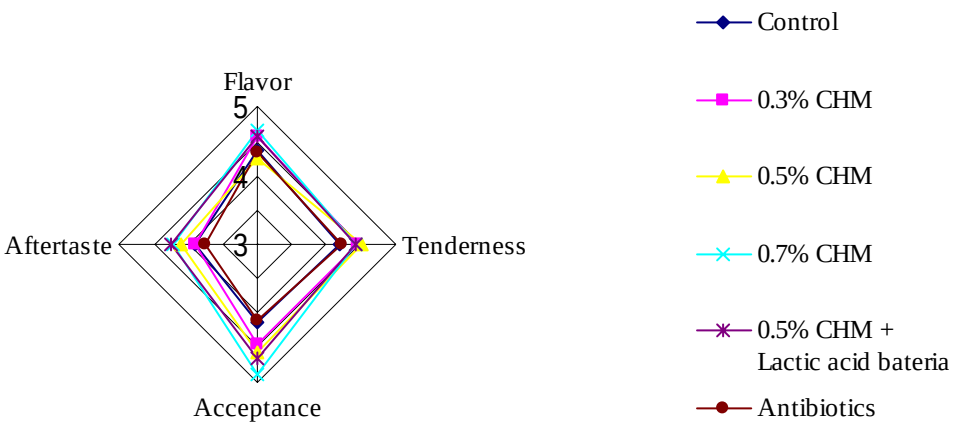

Fig. 1. Effects of supplemental various levels of Chinese traditional herbal medicinal on panel evaluation of porks

Conclusion

Above all, it shown that supplemental Chinese traditional herbal complex medicine in pig diets have beneficial results on growth performance, immune response and pork quality, and the 0.3% displays the best results, have the potential to substitution of antibiotics (chlortetracycline and oxytetracycline).

References

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