PROCEEDINGS OF THE 11th WORLD RABBIT CONGRESS
Qingdao (China) - June 15-18, 2016
ISSN 2308-1910

Session
FEEDS & FEEDING

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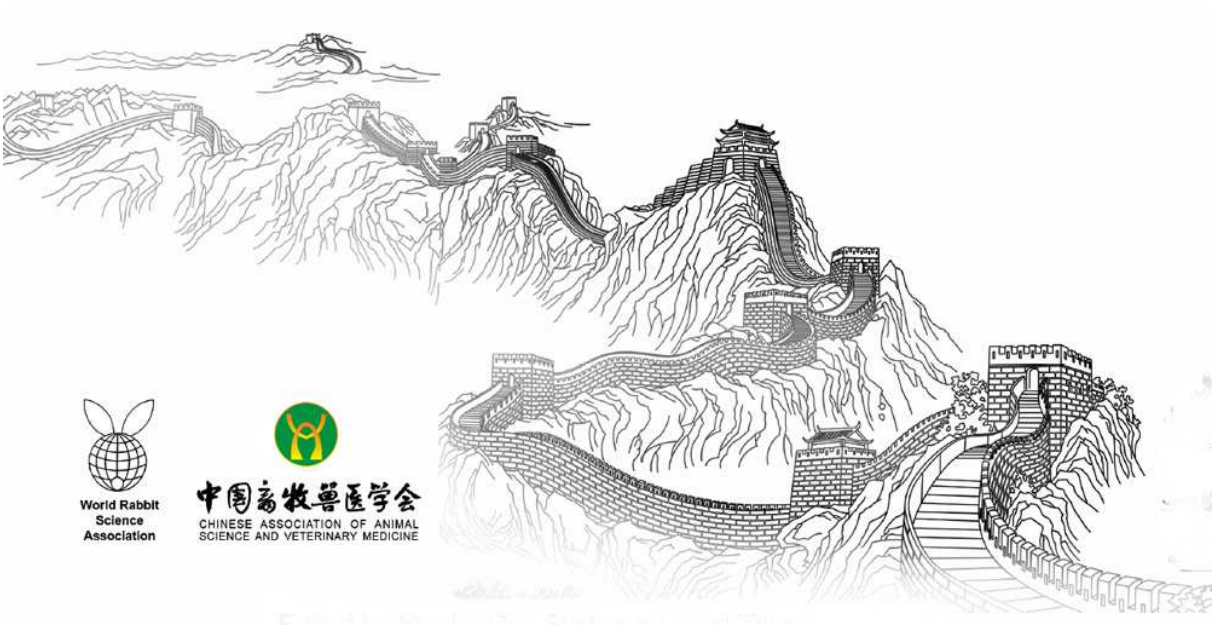
Full text of the communication

How to cite this paper :
Gu W.T, Colin M., Wang G.Q., Liu C.X., Zhang L.X., Yang H.J., Prigent A.Y., 2016 - Influence of a mycotoxin binder based on chinese herb extracts on the mortality and performances of the growing rabbits. *Proceedings 11th World Rabbit Congress - June 15-18, 2016 - Qingdao - China, 405-409.*



INFLUENCE OF A MYCOTOXIN BINDER BASED ON CHINESE HERB EXTRACTS ON THE MORTALITY AND PERFORMANCES OF THE GROWING RABBITS

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ABSTRACT

687 Hyplus PS19 x PS 40 rabbits were split between 3 treatments differentiated by the presence or absence of a mycotoxin binder: control without mycotoxin binder, mycotoxin binder already tested in the literature and mycotoxin binder elaborated using vegetal extracts of the Chinese pharmacopeia.
The 2 mycotoxin binders decreased the mortality and increased the growth between the weaning and 56 days, without big differences between them for the growth and with a lower mortality for the mycotoxin binder using vegetal extracts of the Chinese pharmacopeia. At contrary, few differences were observed between 56 and 70 days. The mycotoxin binders improved the slaughtering yield and decreased the percentage of non-marketable rabbits. In conclusion, this experimentation demonstrates the interest to incorporate a mycotoxin binder in the rabbit feed for improving the zootechnical performances in the first part of the growing period and for increasing the slaughtering results.

Key words: Rabbits, Mycotoxins, Toxin-binder, Chinese herbs, mortality, slaughtering yield.

INTRODUCTION

The sensitivity of the rabbit to mycotoxins contamination has been emphasized in different reviews (Mézes, 2000; Tenier and Colin, 2012). Particularly, the DON which may be present in quite high levels in the rabbit feed is very toxic for this specie (Wannemacher and Wiener, 1997); zealarenon presents negative effects at the level of liver (Čonková and al, 2001) and on the reproduction of the buck (Fenske and Fink-Gremmels, 1990). Toxicity symptoms have been observed too by the rabbits for aflatoxins (Coulombe and al., 1986); fumonisins (Gumprecht and al., 1995; Mariscal-Quintanar and al., 1997); ochratoxin (Chu, 1974; Zofair and al., 1996); citruline (Ajayi and al., 2005); Patuline (Escuola and al., and 1988).

In many cases, several mycotoxins are present in the feed meaning a higher toxicity (Malabous and al 2016). Different companies have created products destined to limit the mycotoxin contamination effects by biotransformation of the mycotoxin, mycotoxin binding, protection of the liver and immunity boosting (Malabous and al., 2016). The efficiency of such products on the limitation of mortality (Tenier and Colin 2012), growth improvement (Farahat and al., 2009), integrity of the liver (Malabous and al., 2016) have been demonstrated but very few experimentations have involved 2 mycotoxins binders. The present work compares the mycotoxin binder used in the majority of the publications (Farahat and al., 2009; Tenier and Colin, 2012) to a product elaborated by the company Centree Bio-Tech (Wuhan - China) Co, LTD using vegetal extracts of the Chinese pharmacopeia.

MATERIAL AND METHODS

Generalities

An experimentation consisting to compare 3 experimental feeds was conducted in September and October 2014 in the farm of the EARL 3L at Ploudalmézeau in Brittany (France).

Animals and treatments

687 Hyplus PS19 x PS 40 rabbits were weaned at 37 days and split between 3 treatments differentiated by the mycotoxin binder situation (Table 1):

- Absence of the mycotoxin binder (Negative control).
- Incorporation of 3 kg / ton of the mycotoxin binder described by Farahat and al., (2009) and Tenier and Colin, (2012) (Positive control).
- Incorporation of 3 kg / ton of the mycotoxin binder elaborated by the company Centree Bio-Tech (Wuhan) Co. LTD using vegetal extracts of the Chinese pharmacopeia (Experimental feed).

The animals were placed in collective cages of 5 rabbits in conditions already described (Teillet and al., 2012). The slaughtering age was 74 days.

Table 1: Experimental diets and number of animals

Diets	Type of mycotoxin binder	Number of cages	Number of rabbits
Negative control	None	57	232
Positive control	Farahat et al 2009; Tenier et Colin 2012	57	226
Experimental feed	product elaborated by the company Anyou	57	229
TOTAL		171	687

The experimental feeds corresponded to a formula already described (Teillet and al., 2011). They were manufactured in the farm. The 3 feeds contain 15 % of a poor quality oat with a high level of ergosterol (20 ppm) indicating a mycotoxin contamination.

The rabbits were restricted according the restriction program described by Teillet et al (2011). The water was distributed ad libitum.

Measured criteria's and statistical analysis

The zootechnical criteria's and Eimeria infestation were measured according to the method described by Malabous and al., (2016). All the parameters were treated with an Analysis of Variance (ANOVA). Mortality was analyzed as described by Savietto and al., (2015). The slaughtering yield and the feed conversion ration were statistically studied according to the method described by Lebas, (1986). The statistical analysis deals with the difference between the 3 treatments and with the contrast control – versus the 2 mycotoxin binders together.

RESULTS AND DISCUSSION

Feed analysis

Even with the incorporation of the poor quality oat, the individual level of every analyzed mycotoxin remained under the level of analytical detection. This work is consequently carried out in conditions quite different of the ones of the literature (Farahat and al., 2009; Tenier and Colin, 2012; Malabous and al., 2016)

Mortality

The 2 mycotoxin binders decreased significantly the mortality between the weaning and 56 days (Table 2). Few effects were observed during the finishing period (56 – 70 days). For all the period, the

2 mycotoxin binders decreased non-significantly the total mortality. Compared to the positive control, the experimental mycotoxin binder enabled the lowest mortalities.
This reduction of mortality when using mycotoxin binder is in agreement with the data's presented by Tenier and Colin, (2012) and Malabous and al., (2016). On the same way, these different experimentations show that the mycotoxin binders are mainly effective between the weaning and 56 days of age.

Diets		Negative control	Positive control	Experimental feed	Total	P 3 treatments	P Mycotoxins binders versus negative control
Number of live rabbits	Weaning (35 days)	232	226	229	687		
	56 days	207	209	216	632		
	70 days	185	184	197	566		
Number of dead rabbits	Weaning - 56 days	25	17	13	55	0,11	0,05
	56 - 70 days	22	25	19	66	0,6	0,94
	Weaning - 70 days	47	42	32	121	0,18	0,19
Mortality (%)	Weaning - 56 days	10,8	7,5	5,7	8,0		
	56 - 70 days	9,5	11,1	8,3	9,6		
	Weaning - 70 days	20,3	18,6	14,0	17,6		

Table 2: Results of mortality

Eimeria
The number of Eimeria oocysts was very high compared to the farm standard (Colin and al., 2013). Eimeria magna represented the main identified specie, meaning a high pathogenicity of this Eimeria contamination (Coudert and al., 1995). Few differences were observed on the number and on the distribution of the Eimeria between the 3 treatments (Table 3), in agreement with Malabous and al., (2016). Consequently, it seems that the mycotoxin binders have no direct influence on Eimeria contamination.

Table 3: Eimeria contamination

Diets		Negative control	Positive control	Experimental feed
Number of Eimeria (OTG / gram)	Total	115 800	98 800	70 400
	Eimeria magna	54 500	50 000	42 400
	Eimeria media	5 200	1 600	1 800
	Eimeria perforans	56 000	45 600	24 000
	Eimeria irresidua	0	1 600	2 300
Percentage of Eimeria	Eimeria magna	47,1	50,6	60,2
	Eimeria media	4,5	1,6	2,5
	Eimeria perforans	48,4	46,2	34,1
	Eimeria irresidua	0	1,6	3,2

Weight and growth
The 2 mycotoxin binders increased highly significantly the ADG between the weaning and 56 days and significantly the weight at 56 days (Table 4) without difference between them. This observation is totally in agreement with Farahat and al., (2009); Tenier and Colin, (2012); Malabous and al., (2016). During the following period, the ADG was significantly higher for the negative control, probably as a consequence of the compensatory growth.

Table 4: Weight and growth

Diets		Negative control	Positive control	Experimental feed	Average	Residual standard deviation	P 3 treatments	P Mycotoxins binders versus negative control
Weight of the rabbits (g)	Weaning (35 days)	870	877	873	873	36	0.88	0.92
	56 days	1 535	1 621	1 625	1 594	90	0.006	0.006
	70 days	2 157	2 178	2 149	2 161	137	0.81	0.99
ADG (g / day)	Weaning - 56 days	35.0	39.2	39.6	37.9	8.2	0.004	0.004
	56 - 70 days	44.4	39.8	37.4	40.5	3.8	0.035	0.06
	Weaning - 70 days	39.0	39.4	38.7	39.0	7.4	0.85	1.00

Intake and FCR

The average daily water intakes were very highly significantly higher with the 2 mycotoxin binders and consequently the mycotoxin binders increased the water / feed ratio (Table 5). The feed intake was lightly increased by the mycotoxin binders (p=0.07) in agreement with Farahat and al., (2009) and Tenier and Colin, (2012). The FCR is improved by the experimental feed.

Slaughtering yield

The 2 mycotoxin binders improve very highly significantly the slaughtering yield, in agreement with the observations of Tenier and Colin, (2012) and Malabous and al., (2016) (Table 6). On the same way, the percentage non marketable rabbits is significantly lower with the 2 feeds with mycotoxin binders (P=0.03).

Table 5: Results of intake and of FCR

Diets	Negative control	Positive control	Experimental feed	Residual standard deviation	P 3 treatments	P Mycotoxins binders versus negative control
Average water intake (ml / day / rabbit)	232.4	248.8	245.2			
Average feed intake (g / day / rabbit)	117.6	120.6	119.1	14.2	0.11	0.07
Water / feed ratio	1.98	2.06	2.06			
Economical FCR	3.97	4.31	3.46	0.39	0.000	0.003
Technical FCR	3.97	4.31	3.46	0.29	0.000	0.003

Table 6: Results of slaughtering

Diets	Negative control	Positive control	Experimental feed	Residual standard deviation	P 3 treatments	P Mycotoxins binders versus negative control
Slaughtering yield (%)	54.8	56.6	55.7	5.6	0.001	0.001
Non marketable rabbits (%)	8.62	3.25	4.49		0.10	0.03

CONCLUSIONS

In conclusion, the 2 mycotoxin binders improve the viability and the growth particularly during the 3 first weeks of the growing – fattening period. Consequently, it is recommanded to incorporate a mycotoxin binder in the rabbit feeds during the weeks following the weaning, even in case of middle level contamination as observed in this experimentation. Practically no difference is observed for the growth between the 2 mycotoxin binders and the mortality is lower for the mycotoxin binder using

vegetal extracts of the Chinese pharmacopeia confirming that it has at least the same efficiency the one previously tested (Farahat and al., 2009; Tenier and Colin, 2012). The mycotoxin binders increase the slaughtering yields and decrease the percentage of the not marketable rabbits; this point is very important for the profitability of the rabbit farming and justifies the use of a mycotoxin binders till the slaughtering of the rabbits, even with a middle level contamination.

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