

Effect of providing different drench solutions on lactating does and suckling kits

László KACSALA, Tamás TÓTH, Zsolt GERENCSEÉR and Zsolt MATICS*

Kaposvár University, Kaposvár, Hungary, *correspondence: matics.zsolt@ke.hu

Abstract

The growing of kits is affected by the genetic background, the maternal (milk production and nursing behavior) and environmental effects. The aim of this study was to examine the willingness and effect of auto-consumption of liquid and powder based drench solutions on does and kits. Two experiments were conducted at Kaposvár University. Experiment 1: 24 does were divided into three groups: Control: ad libitum access of water from two drinkers; Liquid-based drench: ad libitum access of water from one drinker and 5% drench solution by volume from the other drinker; Powder-based drench: ad libitum access of water from one drinker and 5% drench solution by weight from the other drinker. Methodology of experiment 2 was similar, however the provision of drench solution was limited to twice a week (24 h). In both experiments rabbits willingly consumed the solutions, preference of powder-based drench was observed ($P < 0.05$) over water and liquid based drench solution. Except the feed consumption in experiment 1 (ad libitum), none of the examined production traits (body weight of does, milk consumption, litter weight, average body weight, weight gain or the mortality of kits) were affected by the provided solutions. Tendencies suggest repetitions of the experiment with different concentrations and different room temperature.

Keywords: liquid consumption, milk consumption, rabbit growth performance, reproduction

Introduction

While the growth of the fetuses intensifies at the last term of the pregnancy, the feed consumption of the does declines. Thus, the does convert their reserved fat to provide enough energy for growth of fetuses. A second energy-deficit phase could be observed during the peak period of lactation. From that time, the does are not able to satisfy the nutrient requirements of the kits (Xiccato et al., 1995). This can lead to a declining body condition, which could affect the milk production and the lifespan of the does (Sánchez et al., 2012). During these periods does are not able to consume the required amount of feed. Due to the high fiber content of the feed the protein- and energy content is also limited.

On the other hand - due to the fluctuating climate (global warming) - the average daily temperature increases, which causes a “challenge to solve” for rabbit production (Al-Saefa et al., 2008). The control of the temperature inside the stable is limited. An increased temperature causes reduction in feed consumption, which will also lead to a decline in milk production and/or body condition of lactating does (Marai et al., 2002).

In other species the force-feeding of drench solution is used to provide a high energy source right after parturition or as part of a treatment (Kass et al., 2013). The drenching method (voluntary intake and/or force-feeding of drench) is widely used e.g. in the case of dairy cows right after calving.

The aim of the experiments were to examine the willingness and effect of auto-consumption of liquid and powder based drench solutions on does and kits.

Materials and methods

Two experiments were conducted at the rabbit farm of Kaposvár University with Pannon Ka rabbits (n=24 does and their litters per experiment). Does were housed individually in open top wire-mesh pens (0.5 · 1 · 1 m). Each pen was equipped with a 30 cm wide feeder (commercial pellet ad libitum; DE: 11 MJ·kg⁻¹; crude protein: 18.1%; crude fiber: 15.3%, as in feed) and two cup drinkers with bottles. Controlled nursing was applied till 16 d of age. The temperature varied between 21 and 27 °C. The daily lighting was 16 hours.

After kindling, litters were equalized to eight kits per litter. Kits under 45 g of bodyweight were removed, dead kits were not replaced through the experiments. Experiments lasted from 11 d before parturition to weaning (35 d of age).

Experiment 1: 11 days before parturition, pregnant does were divided into three groups (n=8 per group): Control (C): Ad libitum access of water from both drinkers; Liquid-based drench (L): ad libitum access of water from one drinker and 5% drench (water 50%, glycerin 20%, dextrose 20%, Celmanax liquid 5%, MHA liquid 5%) solution by volume from the other drinker; Powder-based drench (P): ad libitum access of water from one drinker and 5% drench (maltodextrin 30%, dextrose 35%, whey powder 25%, WPC-80 9.8%, Coleis 0.2%) solution by weight from the other drinker. Daily liquid consumption was measured every morning at 8 am.

Experiment 2: Methodology was similar to experiment 1, however ad libitum drench solution was provided twice a week for 24 h (Monday; Thursday from 8 am).

Feed consumption was weekly measured. Body weight of does was measured after parturition, and at 7, 10, 14, 17 and 35 d of lactation. Milk consumption of kits were calculated as the difference of the body weight of does before and right after nursing at age of 3, 7, 10, 14 and 17 d. Litter weight was measured at 2, 9, 16, 21 and 35 d of age before nursing. Body weight gains were calculated. Died kits were recorded every day.

The liquid consumption, average daily feed consumption, milk production, body weight and body weight gain of does and kits were evaluated by One-Way ANOVA, the mortality of suckling kits was evaluated by Chi² test with SPSS 10.0 software.

Results and discussion

In both experiments rabbits covered the daily fluid requirement mostly by consuming the drench solutions. The Table 1 shows that during the whole period of experiment 1 (ad libitum drench) there were significant differences ($P < 0.05$) between the groups, mostly in favour of the powder-based drench solution. It was observed, that after leaving the nest at age of 16 d, kits started to consume the drench solutions, preferably the powder-based one. This could be caused by the semi-sweet, milk-like odor and flavor of the solution. In the experiment 2 (limited access to drench) the results were similar to experiment 1, but not so pronounced. Temperature fluctuated between 21-27 °C, no tendencies in examined traits were observed during the experiments.

Table 1. Average daily liquid consumption ($\text{mL} \cdot \text{d}^{-1}$) of rabbits during ad libitum drench provision, experiment 1

Days before-after parturition	Drinkers*						Prob.
	C	CW	L	LW	P	PW	
-11-(-7)	25.4 ^b	13.5 ^{ab}	8.6 ^a	21.9 ^b	13.3 ^{ab}	21.3 ^{ab}	0.003
-6-0	27.2 ^{ab}	12.2 ^a	10.7 ^a	26.8 ^b	25.2 ^{ab}	26.5 ^{ab}	0.003
1-7	29.3 ^{ab}	32.4 ^{ab}	17.6 ^a	31.9 ^{ab}	48.3 ^b	37.7 ^{ab}	0.002
8-14	30.8 ^a	57.2 ^{ab}	38.7 ^a	28.6 ^a	83.7 ^b	39.7 ^a	0.001
15-21	43.9 ^a	52 ^a	54.8 ^a	33.1 ^a	96.5 ^b	31 ^a	<0.001
22-28	48.8 ^a	76.6 ^{ab}	67.5 ^{ab}	35.3 ^a	113.4 ^b	35.9 ^a	<0.001
29-35	51.1 ^{ab}	100.1 ^{bc}	107.7 ^c	53.1 ^{abc}	220.8 ^d	42.4 ^a	<0.001

Means with the same letter are not significantly different from each other ($P \geq 0.05$); * C - Control group, water; CW - Control group, water; L - Liquid based group, drench solution; LW - Liquid based group, water; P - Powder based group, drench solution; PW - Powder based group, water.

In overall, the provided drench solutions did not affect the average daily feed consumption. However, in experiment 1, in most observed days the rabbits with provided drench solutions consumed less feed compared to the control group (Table 2). At the second and fourth week of lactation the differences were significant ($P < 0.05$). During the limited access (experiment 2) the tendencies ($P \geq 0.05$) were similar, but none of the treatments had significant effect on the body weight of does, the milk consumption, litter weight, average body weight, weight gain or the mortality of kits ($P \geq 0.05$).

Table 2. Average daily feed consumption of litter per pen and mortality of kits during the ad libitum drenching (experiment 1)

Days of age	Groups*			SE	Prob.
	C	L	P		
Average daily feed consumption (g·d ⁻¹ ·pen ⁻¹)					
1-7	206	191	196	8.98	0.083
8-14	290 ^a	242 ^b	268 ^b	7.54	0.027
15-21	340	306	308	7.32	0.118
22-28	500 ^a	429 ^b	426 ^b	13.4	0.039
29-35	616	639	613	13.95	0.725
Mortality of kits (%)					
1-16	1.6	1.6	1.6		0.726
17-35	3.1	4.7	4.7		0.941

Means with the same letter are not significantly different from each other ($P \geq 0.05$); * C - Control: *Ad libitum* water access from both drinkers; L - Liquid-based drench: one drinker water, one drinker 5% drench solution by volume *ad libitum*; P - Powder-based drench: one drinker water, one drinker 5% drench solution by weight *ad libitum*.

Conclusions

Does and kits willingly consumed the drench solutions. Rabbits preferred the powder based drench solution over the liquid based solution and over water. Consumption of drench solutions did not affect the production of lactating does and growth of suckling kits. Further studies are needed to prove the effect of drenching by changing the composition or the concentration of the solutions. Comparison of different ambient temperatures (e.g. 20 °C and 30 °C) is suggested.

Acknowledgements

Supported by the GINOP-2.1.1.-15-2015-00560 project and ÚNKP-17-3 New National Excellence Program of the Ministry of Human Capacities.

References

- Al-Saefa, A.M., Khalila, M.H., Al-Homidana, A.H., Al-Dobaiba, S.N., Al-Sobayila, K.A., Garcíab, M.L., Basalgac, M. (2008) Crossbreeding effects for litter and lactation traits in a Saudi project to develop new lines of rabbits suitable for hot climates. *Livestock Science*, 118, (3), 238-246.
DOI: <https://dx.doi.org/10.1016/j.livsci.2008.01.025>
- Kass, M., Ariko, T., Samarütel, J., Ling, K., Jaakson, H., Kaart, T., Arney, D., Kart, O., Ots, M. (2013) Long-term oral drenching of crude glycerol to primiparous dairy cows in early lactation. *Animal Feed Science and Technology*, 184, 58-66. DOI: <https://dx.doi.org/10.1016/j.anifeedsci.2013.06.004>
- Marai, I.F.M., Habeeb, A.A.M., Gad, A.E. (2002) Rabbits' productive, reproductive and physiological performance traits as affected by heat stress: a review. *Livestock Production Science* 78, 71-90.
DOI: [https://dx.doi.org/10.1016/S0301-6226\(02\)00091-X](https://dx.doi.org/10.1016/S0301-6226(02)00091-X)
- Sánchez, J.P., de la Fuente, L.F., Rosell, J.M. (2012) Health and body condition of lactating females on rabbit farms. *Journal of Animal Science*, 90, 2353-2361. DOI: <https://dx.doi.org/10.2527/jas.2011-4065>
- Xiccato, G., Parigi-Bini, R., Dalle Zotte, A., Carazzolo, A., Cossu, M.E. (1995) Effect of dietary energy level, addition of fat and physiological state on performance and energy balance of lactating and pregnant rabbit does. *Animal Science*, 61, (2), 387-398.
DOI: <https://dx.doi.org/10.1017/S135772980001393X>