APRW -30

Reproductive Performance of Doe Rabbits on Varying Levels of Oyster Mushroom (*Pleurotus ostreatus*) Extract Under Two Housing Types

O.O. Olatubosun[1]*, O.M. Sogunle[1], O.A. Adeyemi[1] and A.M. Bamgbose[2]
[1]Department of Animal Production and Health, Federal University of Agriculture, Abeokuta. PMB 2240, Abeokuta, Ogun State, Nigeria; [2]Department of Animal Nutrition, Federal University of Agriculture, Abeokuta. PMB 2240, Abeokuta, Ogun State, Nigeria.
Corresponding author: E-mail: oladipoolatubosun@yahoo.com, Phone: +2347034929923

Abstract
A total of 48 rabbits consisting of 32, 5½ months old does and 16, 5½ months old bucks of mixed breeds were used for this study. The rabbits were allotted into two different housing types of steel and wooden hutches composed of four varying levels of oral administration of Oyster mushroom extract. Four Does were assigned to each treatment group and each doe served as a replicate. The varying levels of Oyster mushroom extract were 0, 5, 10 and 15 ml per litre of fresh drinking water. The administration of Oyster mushroom extract levels started on the day at which the Does were mated till when the kits from the Does were weaned (at 6 weeks old).Data were collected at kindling and during pre-weaning stage of the lactating does and kits. The experiment layout was a 2 × 4 factorial arrangement and the data obtained were subjected to a Completely Randomized Design. Significant ($p<0.05$) differences were obtained on weight of doe at kindling and weight of doe at weaning from the female rabbits on varying levels of mushroom extract. The rabbit does on 10 ml of mushroom extract per litre of drinking water had the highest value for weight of doe at kindling (2331.30 g) and weight of doe at weaning (2275.00 g). The oral administration of oyster mushroom extract at 10 ml per litre of drinking water can improve on the weight of Does during gestation and pre-weaning of kits.

Keywords: Reproductive performance, doe rabbits, oyster mushroom extract, steel hutch, wooden hutch

Introduction

In rabbit production, housing constitutes an important factor in effective management (Mailafia *et al.,* 2010). Poor housing, which is common to the lesser developed countries, is a limiting factor affecting growth of rabbits (McNitt *et al.,* 2000). The main welfare indicators to assess suitability of rabbit housing are mortality, morbidity, physiological parameters, rabbit behaviour and production performance (Hoy, 2008). Housing system is one of the factors that moderately affect performance (Dal Bosco *et al.,* 2000; Pla, 2008) and reproductive behaviour of rabbits (Marai and Rashwan, 2003). Mortality, morbidity and production performance of rabbits can be improved upon with the use of multivitamins and antibiotics. However, livestock farmers are increasing efforts to eliminate the usage of antibiotics and attempts are been made to replace chemical compounds from conventional multivitamins and antibiotics with natural plant products as active substances to improve on production results and health condition of rabbits (Gugolek *et al*., 2011). This thus, necessitated the need to search for an organic agriculture friendly and cheaper alternative to the usage of conventional drugs such as the application of mushrooms. *Pleurotus* species is reported to be the second most important mushroom in production in the world and it accounts for 25% of the total world production of cultivated mushrooms and the most popular in Nigeria (Adejoye *et al*., 2006 and Fakoya, 2011).The reported high nutritive value of *Pleurotus* species (Çağlarırmak, 2007;Alam *et al*., 2008 and Marshall and Nair, 2009) necessitated the investigation into the performance response of rabbits to varying levels of *Pleurotus ostreatus*.

Hence, this research studied the reproductive performance of doe rabbits on varying levels of oyster mushroom (*pleurotus ostreatus*) extract under two housing types.

Materials and Methods

A total of 48 rabbits consisting of thirty-two, 5½ months old Does and sixteen, 5½ months old bucks of mixed breeds (Chincilla, Dutch and New Zealand White) of live-weight range of 1900-2050 g were used for this study. The rabbits were allotted into two different housing types of steel and wooden hutches composed of four varying levels of oral administration of Oyster mushroom (*Pleurotus ostreatus*) extract. Four Does were assigned to each treatment group and each doe served as a replicate while two bucks were assigned to each treatment group. The experiment started at the day of mating and ended at the day of weaning. The rabbits were maintained on a uniform feed of concentrate diets. The varying levels of Oyster mushroom extract were 0, 5, 10

and 15ml per litre of fresh drinking water. Antibiotics and multi-vitamins were administered orally during the course of the experiment only to rabbits with no level of inclusion of Oyster mushroom extract.

The Oyster mushroom extract levels was administered to the rabbits thrice per week and at a day interval within each week. The administration of Oyster mushroom extract levels started on the day at which the Does were mated till when the kits from the Does were weaned (at 6 weeks old).The rabbits were housed individually in the steel and wooden hutch with each cell having dimension 60 x 60 x 50 cm. Feed and water troughs were provided in the hutches with unrestricted access to feeds and drinking water. The rabbits were raised under ambient temperature and photoperiod. The mating ratio was two Does to one buck while the mating process was carried out in the morning and late in the evening to ensure fertilization (mating each doe twice the same day). On the 28th day of pregnancy, next boxes were introduced into the maternity cells of each pregnant Does to enhance proper preparation of Does for kindling. Data were collected at kindling and during pre-weaning stage of the lactating does and kits.

The experiment layout was 2 × 4 factorial arrangement and the data generated were subjected to a Completely Randomized Design. Significant ($p< 0.05$) differences were separated using Tukey Test as contained in MINITAB 17 computer package. Also, data generated were analysed using General Linear Model (GML) of the same package.

Results and Discussion

The effects of housing types and varying levels of Oyster mushroom extract on reproductive performance of rabbit Does at kindling and during pre-weaning of kits is shown on Table 35. There was no significant ($p>0.05$) effect of the housing types on the reproductive performance parameters of Does at kindling and during pre-weaning of kits. This implies that housing types which can also affect relative humidity, air flow, lighting and temperature within the hutches does not have effect on reproductive behaviour and performance of the does (Das and Sikka, 2007). Similar results were obtained between doe kept in steel hutch and wooden hutch on litter birth size indicates that housing types do not have effect on fertility of bucks and ovulation in Does and this supports Alfonso-Carrillo (2014) who reported that type of cage does not affect fertility, prolificacy and litter size during reproductive cycles of Does.

Table 2 Effects of housing types and Oyster mushroom extract levels on reproductive performance of rabbit Does at kindling and during pre-weaning of kits

	Housing types			Mushroom extract levels				
Parameters	Steel hutch	Wooden hutch	SEM	0	5 ml	10 ml	1 5ml	SEM
Litter birth size/doe	5.25	5.69	0.39	5.25	5.63	5.88	5.13	0.55
Litter birth weight/doe (g)	254.30	267.30	15.80	257.70	268.00	287.30	230.00	22.3
Average birth weight per kit (g)	48.71	48.28	1.53	51.04	48.21	49.30	45.41	2.17
Litter size at weaning/doe	4.63	4.81	0.38	4.50	5.13	5.13	4.13	0.54
Litter weight at weaning (g)	2853.00	2931.00	167.00	2863.00	2956.00	3156.00	2594.00	237.00
Average weight at weaning per kit (g)	637.50	632.90	27.00	658.20	594.80	637.10	650.40	38.20
Pre-weaning weight gain per kit (g)	588.70	584.60	26.50	607.20	546.60	587.80	605.00	37.40
Pre-weaning mortality (%)	12.99	13.61	3.70	12.77	6.92	12.44	21.07	5.23
Male to female ratio of kits at weaning	1.91:1.00	1.45:1.00	0.40	1.34.1.00	2.31:1.00	1.68:1.00	1.38:1.00	0.57
Weight of doe after kindling (g)	2059.40	2150.00	50.9	2081.30^{ab}	1931.30^{b}	2331.30^{a}	2075.00^{ab}	72.00
Weight of doe at weaning (g)	2028.10	2159.40	54.10	2068.80^{ab}	1950.00^{b}	2275.00^{a}	2081.30^{ab}	76.50
Weight change of lactating doe (g)	-31.30	9.40	24.40	-12.50	18.80	-56.30	6.20	34.60
% weight change of lactating doe	-1.21	0.42	1.20	-0.49	1.10	-2.64	0.45	1.70

$^{a,b:}$ Means in the same row with different superscripts differ significantly ($p<0.05$); SEM= Standard error of mean

Significant ($p<0.05$) differences were obtained on weight of doe at kindling and weight of doe at weaning from the rabbit Does on varying levels of mushroom extract. The rabbit does on 10 ml of mushroom extract per litre of drinking water had the highest value for weight of doe at kindling (2331.30 g) and weight of doe at weaning (2275.00 g) while the rabbit Does on 5ml of mushroom extract per litre of drinking water had the lowest value for weight of doe at kindling (1931.30 g) and weight of doe at weaning (1950.00 g). The superior weight of Does at kindling and weaning on 10 ml of oyster mushroom extract as compared to Does on conventional multivitamins and antibiotics support the reports of Çağlarırmak (2007), Marshall and Nair (2009) and Bilal *et al.* (2010) that Oyster mushrooms have been found to have nutritional values that can enhance growth performance.

Conclusion and Recommendation

It was concluded that housing types does not influence the Doe performance at kindling and during pre-weaning of kits. The oral administration of oyster mushroom extract at 10 ml per litre of drinking water can

improve on the weight of Does during gestation and pre-weaning of kits. Administration of oyster mushroom extract at 10 ml per litre of drinking water can be adopted for rabbit does during breeding period for an enhanced body weight during gestation and pre-weaning.

References

Adejoye, O.D., Adebayo-Tayo, B.C., Ogunjobi, A.A., Olaoye, O.A. and Fadahunsi, F.I. (2006). Effect of carbon, nitrogen and mineral sources on growth of *Pleurotus florida*, a Nigeria edible mushroom. *African Journal of Biotechnology*, 5: 1355-1359.

Alam, N., Amin, R., Khan, A., Ara, I.,Shim, M. J., Lee, M.W. and Lee, T.S. (2008). Nutritional Analysis of Cultivated Mushrooms in Bangladesh; *Pleurotus ostreatus*, *Pleurotus sajor-caju*, *Pleurotus florida* and *Calocybe indica. Mycobiology*, 36(4): 228-232.

Alfonso-Carrillo, C., Garcia-Rebollar, P., De Blas, C., Ibanez, M.A. and Garcia-Ruiz, A.I. (2014). Effect of late weaning and use of alternative cages on performance of does, suckling and fattening rabbits under extensive reproductive management. *INVE_MEM_2014_190084*, 426-433.

Bilal, A.W., Botha, R.A. and Wani, A.H. (2010). Nutritional and medicinal importance of mushrooms. Department of Botany, University of Kashmir, Hezratbal, Strinagar 190006, India.

Çağlarırmak, N. (2007). The nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus* species) and an estimated approach to the volatile compounds. *Food Chemistry*, 105, 1188–1194.

Dal Bosco, A., Castellini, C., Bernadini, M. (2000). Productive performance and carcass and meat characteristics of cage or pen-raised rabbits. *World Rabbit Science, 8(1): 579-583.*

Das, S.K. and Sikka, A.K. (2007). Effect of different housing and feeding systems on the performances of broiler rabbit in Eastern Himalayan Region of India. *Livestock Research for Rural Development,* 19(8).

Fakoya, S. (2011). Bio-safety quality and nutritional status of *Pleurotus ostreatus* cultivated on sawdust of two selected tropical trees. *Research Journal of Environmental Toxicology,* 5: 378-384.

Gugolek, A., Kowalska, D., Konstantynowicz, M., Strychalski, J. and Bukowska, B. (2011). Performance indicators, health status and coccidial infection rates in rabbits fed diets supplemented with white mustard meal. *Annals of Animal Science,* 11(3): 425-432.

Hoy, S.T. (2008). Guidelines for minimum standards on rabbit housing in Germany. *9th World Rabbit Congress*- June 10-13, 2008 – Verona – Italy.

Pla, M. (2008). A comparison of the carcass traits and meat quality of conventionally and organically produced rabbits. *Livestock Science, 115: 1-12.*

Mailafia, S.L., Onakpa, M.M. and Owoleke, O.E. (2010). Problems and prospects of rabbit production in Nigeria: a review. *Bayero Journal of Pure and Applied Sciences, 3(2)*: 20-25.

Marai, F.M. and Rashwan, A.A. (2003). Rabbit behaviour under modern commercial production conditions - a review. *Archives Animal Breeding,* 46(4): 357-376.

Marshall, E. and Nair, N.G. (2009). *Make Money by growing Mushrooms: Diversification booklet 7. Rural Infrastructure and Agro-Industries Division*. Food and Agriculture Organization of the United Nations, Rome.

McNitt, J.I., Patton, N.M., Lukefahr, S.D. and Cheeke, P.R. (2000). *Rabbit production* (8thEdition). Interstate Printers and Publishers, Danville, IL.