

Calcium and phosphorus excretion and retention in diets of laying hens fed soybean waste fermented by *Trichoderma viride*

by Jein Rinny Leke 26

Submission date: 01-Apr-2021 08:28AM (UTC+0700)

Submission ID: 1547768473

File name: ying_Hens_Fed_Soybean_Waste_Fermented_by_Trichoderma_Viride.pdf (539.83K)

Word count: 3909

Character count: 20089



Livestock Research for Rural Development

The peer-reviewed international journal for research
into sustainable developing world agriculture

28

Published by *Fundación CIPAV*, Cali, Colombia

*Centro para la Investigación en Sistemas Sostenibles
de Producción Agropecuaria, Cali, Colombia*

ISSN **0121-3784**

Official Home Page: <http://www.lrrd.org>

E-mail: lrrd@lrrd.org

- ↪ [Volume 1 \(1989\)](#)
- ↪ [Volume 2 \(1990\)](#)
- ↪ [Volume 3 \(1991\)](#)
- ↪ [Volume 4 \(1992\)](#)
- ↪ [Volume 5 \(1993\)](#)
- ↪ [Volume 6 \(1994\)](#)
- ↪ [Volume 7 \(1995\)](#)
- ↪ [Volume 8 \(1996\)](#)
- ↪ [Volume 9 \(1997\)](#)
- ↪ [Volume 10 \(1998\)](#)
- ↪ [Volume 11 \(1999\)](#)
- ↪ [Volume 12 \(2000\)](#)
- ↪ [Volume 13 \(2001\)](#)
- ↪ [Volume 14 \(2002\)](#)
- ↪ [Volume 15 \(2003\)](#)
- ↪ [Volume 16 \(2004\)](#)
- ↪ [Volume 17 \(2005\)](#)
- ↪ [Volume 18 \(2006\)](#)
- ↪ [Volume 19 \(2007\)](#)
- ↪ [Volume 20 \(2008\)](#)
- ↪ [Volume 21 \(2009\)](#)
- ↪ [Volume 22 \(2010\)](#)
- ↪ [Volume 23 \(2011\)](#)
- ↪ [Volume 24 \(2012\)](#)
- ↪ [Volume 25 \(2013\)](#)
- ↪ [Volume 26 \(2014\)](#)
- ↪ [Volume 27 \(2015\)](#)
- ↪ [Volume 28 \(2016\)](#)
- ↪ [Volume 29 \(2017\)](#)
- ↪ [Volume 30 \(2018\)](#)
- ↪ [Volume 31 \(2019\)](#)
- ↪ [Volume 32 \(2020\)](#)
- ↪ [Volume 33 \(2021\)](#) New

↪ [Free Text Search](#)

↪ [Notes to Authors: Guide for preparation of papers](#)

↪ [LRRD Newsletter](#)

↪ [LRRD Mission](#)

↪ [If you have difficulties reading the papers](#)

Editors

*Dr. Thomas R Preston (e-mail: reg.preston@gmail.com)
Fundación CIPAV, Colombia*

*Rene Sansoucy (e-mail: LRRDRs@wanadoo.fr)
La Baule, France*

Dr José Segura Correa (e-mail: jose.segura52@hotmail.com)

*Héctor Osorio - Technical Editor (e-mail: hector@fun.cipav.org.co)
Fundación CIPAV, Colombia*

Consultants in Electronic Publishing

*Dr. Andrew W Speedy (e-mail: awspeedy@gmail.com)
Nicholas Waltham (e-mail: nwaltham@yahoo.com)*



Livestock Research for Rural Development

The peer-reviewed international journal for research
into sustainable developing world agriculture

Published by Fundación CIPAV, Cali, Colombia

Volume 27, On-line Edition

↪ [Issue 1 \(January\)](#)

↪ [Issue 2 \(February\)](#)

↪ [Issue 3 \(March\)](#)

↪ [Issue 4 \(April\)](#)

↪ [Issue 5 \(May\)](#)

↪ [Issue 6 \(June\)](#)

↪ [Issue 7 \(July\)](#)

↪ [Issue 8 \(August\)](#)

↪ [Issue 9 \(September\)](#)

↪ [Issue 10 \(October\)](#)

↪ [Issue 11 \(November\)](#)

↪ [Issue 12 \(December\)](#)

ISSN **0121-3784**

Contents

Papers:

215. [Growth and economic performance of broilers fed diets containing rosella \(*Hibiscus sabdariffa*, Linn.\) seeds meal in Senegal](#); S B Ayssiwede, D F Atakoun, Y Issa and A Missouhou (In French) **36**
216. [Dairy good practices: Characterization of bovine dairy systems in Northern Antioquia and its relationship with hygienic and sanitary quality of raw milk](#); M F Cerón-Muñoz, J P Ramírez Arias, D M Bolívar-Vergara, G I Bedoya and L G Pineda (In Spanish) **19**
217. [Effect of water spinach on methane production in an *in vitro* incubation with substrates of *Bauhinia \(acuminata\)* and *Guazuma ulmifolia* leaves](#); Phonevilay Seng and T R Preston **31**
218. [Chemical composition of ruminant meats in Algeria: effects of species, age, gender and muscles](#); N Hafid and M Meziane (In French) **18**
219. [Organoleptic characteristics of eggs laid by local hens fed Skipjack fish waste as a source of omega-3 fatty acids in the diets](#); J R Leke, Achmanu, O Sjöfjan, M Najoan and J S Mandey
220. [Application of Model Impact Measurement \(MEMI\) to assess the indicators that most affect milk production in the genetics research farm of the Institute of Animal Science \(ICA\), Mayabeque, Cuba](#); Idalmis Rodríguez, Verena Torres, O Martínez and J Álvarez (In Spanish) **26** **26**
221. [Dynamics of extensive sheep production systems in Morocco](#); A Boughalmi, A Araba and M Yessef
222. [Comparison of slow-release urea sources on *in vitro* degradation of King grass \(*Pennisetum purpureum x Pennisetum typhoides*\)](#); R R Noguera, S L Posada and C A Trepo (In Portuguese) **32**
223. [Coprological prevalence of bovine fascioliasis, its epidemiology and economic significance in Chittagong district, Bangladesh](#); P Chakraborty and M A M Rahman **23**
224. [Effect of litter size at birth and the number of suckled kits on the milk production of two genotypes and on growth of their young rabbits during the birth to weaning phase](#); Karima Chibah-Ait Bouziad and Nacira Zerrouki-Daoudi (In French)
225. [The impact of the new dairy policy on performance of a local dairy chain: case of the wilaya of Tizi-Ouzou - Algeria](#); M Makhlouf (In French)
226. [Perception and practices of farmers on the utilization of sweetpotato, and other root tubers, and banana for pig feeding in smallholder crop-livestock systems in Uganda](#); M M Dione, D Pezo, G Kyalo, L Mayega, G Nadiopé and B Lukuyu
227. [Calcium and phosphorus excretion and retention in diets of laying hens fed soybean waste fermented by *Trichoderma viride*](#); J S Mandey, J R Leke and C A Rahasia
228. [Performance and carcass characteristics of hair sheep lambs finished on tropical pasture or rangeland and supplemented with maize](#); Stuart A Weiss, R W Godfrey, R Ben-Avraham and R C Ketring
229. [Characterization of a traditional *Michouna* cheese from the region of Tébessa, Algeria](#); M Derouiche and M N Zidoune (In French)
230. [The effects of dietary probiotics on natural IgM antibody titres of Kenyan indigenous chicken](#); J O Khobondo, P B Ogore, J A Atela, P S Onjoro, J O Ondiek and A K Kahi

Short communications

231. [Fenugreek \(*Trigonella foenum-graecum* L.\): A phytochemically-rich chemurgic plant with agronomic, pharmaceutical and nutraceutical potential](#); S K Basu

Administrative

- [LRRD Newsletter](#)
- [Norms for preparation of papers for LRRD](#)

Calcium and phosphorus excretion and retention in diets of Indonesian fed soybean waste fermented by *Trichoderma reesei*

J S Manday, J R Lestari, A Rahasia
State Department of Animal Production, Faculty of Agriculture, Bogor Agricultural University, Bogor, Indonesia
Animal Production Department, Faculty of Agriculture, Sunan Kalijaga University, Yogyakarta, Indonesia

Abstract
A 16-week experimental study on the effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. The experiment was designed to completely randomized design (CRD) with 5 treatments and replication. Dietary treatments were SWW fermented for 3, 5, 7, 9 days and 9 days-based diet, as SWW-3, SWW-5, SWW-7 and SWW-9, respectively. The method of total excreta collection was applied to determine Ca and P excretion and retention.

The statistical evaluation of the dietary response indicated no difference in Ca intake, in Ca excretion and P excretion of the birds fed SWW fermented for 3, 5, 7, 9 days in diet compared to fermented SWW in the diet. There were differences in Ca retention, P intake and P retention. It could be concluded that SWW fermented for 3, 5, 7, 9 days was the best. Feed produced by microbial fermentation of SWW could be successfully used as poultry feed.

Keywords: Tempur (or tempur) is a solid fermented soybean product that is consumed widely in Indonesia, and in many parts, they have been considered interest in the West, especially the USA. In the processing of tempur, the seed coat of fed of soybean will be discarded after soaking and dehulling of tempur processing an industrial waste (Nediala, 2011). Izzati (2007) reported that soybean hulls contained 14.9% crude protein, 3.5% crude fat, 24.4% crude fibre and 2800 kcal/kg metabolizable energy, and were considered to be excellent source of calcium (Ca) and phosphorus (P). And, although the Ca and P levels are variable, most products contain between 7 to 10% Ca and 2.5 to 3% P.

Soybean waste (SWW) can be an alternative feed ingredient for poultry, because it was available and does not compete with human needs. However, feed ingredients derived from agro waste are usually very limited use for poultry diet, because these materials generally contain high crude fibre. According to Nouri and Fischer (1996) the dietary fibre in cereals and soybean seeds acts as an excretory ball and the cell wall material. These fibres may affect nutrients and especially calcium (Ca) and phosphorus (P) (Van der Aar et al. 1983). The absorption of certain dietary nutrients depends on their bioavailability from digestible plant resources. The relationship between dietary nutrients and physiological state of the animal. The effect of feed ingredients has been shown to have significant effects on digestion and absorption of nutrients in chickens (Krogholt 1986). Therefore, the necessary effort is to overcome the weakness of the nutrients through bioconversion process which can be made with fermentation technology, that is one alternative and inexpensive method to improve the nutritional value of waste. Fermentation with the fungus *Trichoderma reesei* could produce various substrates, especially the high crude fibre such as SWW. *Trichoderma reesei* has presence in produce cellulase in relatively large quantities in order to degrade cellulose (Kakimaru et al. 2010), and also have enzyme to produce pectinase and xylanase (Hamby et al. 1984).

The digestion of Ca and P in poultry have been generally measured over the total digestive tract (Common et al. 1981) and the rate relationships between dietary Ca and P concentrations in poultry are available for most species but not reported for many years. The importance of the identification of the Ca bioavailability in laying hens has been of great interest to researchers for long time (De Wit et al. 2004). Calcium is an important nutrient for shell strength (Williams et al. 2006), and is the main mineral component of the egg which represents of the mineral egg quality (Burdick and Gross 1987). Ireland et al. (1990) reported that Ca deficiency led to decreased egg production, feed consumption and bone density and strength. While excess calcium significantly reduced egg production, and feed consumption (Hansen and Wadhvani 1971), and high dietary Ca have negative effect on P absorption in different species (Li et al. 2004).

Reduction of excretion rate is important to be become one of the most important tasks in modern poultry production. Poultry diets are usually based on cereals in which the mineral P is bound in the form of phytic acid, and phytic acid can reduce complexes with mineral Ca (Pinar et al. 2005). Utilization of plant P by chickens is poor because a significant proportion of the total P in the organic feed ingredients is bound to phytin (Lockwood and Papp 1994). Several studies have shown that dietary P concentration is an important factor that affects apparent P availability by poultry (Jain et al. 1996; Haldanaisari and Decker 2005).

A high ratio of dietary Ca to P reduces digestibility and absorption of Ca and P due to increased precipitation of Ca-P complexes (Pattamut et al. 2008; Seli et al. 2009). However, because Ca is the mineral added in higher concentrations in poultry diets, it has a greater impact in forming insoluble phosphate than other dietary minerals. Both Ca and P available for absorption (Tamim et al. 2004).

The research was conducted to investigate the chemical composition and mineral Ca and P contents of better chicken fed diets containing varying duration time of fermentation of soybean waste.

Materials and methods

Collecting and processing of soybean waste

The tempur was prepared according to traditional methods such as soaking, boiling, heating, drying and fermentation (Hidajat 1982; Nuri 1991; Egruanti and Anwar 2007). In this study, it is necessary to remove inhibitors from the soybean and to lower the acidity by adding necessary microorganisms (Hidajat 1982; Nuri 1991). The grains were dehulled, and the separated soybean waste could be using either as feed ingredients or as manure. The dehulling and shelling soybean waste were collected and processed into feed.

Soybean waste were dried and ground and then covered with aluminum foil. The substrate then was inoculated at 25 °C for 15 minutes. The inoculated samples were allowed to cool to ambient temperature before inoculation. All experiments were performed in triplicate.

Inoculum was made by the suspension of filamentous fungi *Trichoderma reesei* (strain of F-11) and substrate waste in 50 ml of water and 20 g of 2% CHN₂PN₄ 6.75 g, NaH₂PO₄ 0.3 g, K₂CO₃ 0.3 g, MgSO₄ 0.3 g, FeSO₄ 0.05 g, 0.5 g/ml 1.1 media/sterilized in 15 min. Soybean waste and then inoculated with inoculum of F-11 on 50 g SWW for 3 days, 5 days, 7 days and 9 days of incubation. Then, the fermented soybean waste was dried and ground for bioassay.

Diets

The experiment was designed to completely randomized design (CRD) with treatment and replication. Dietary treatments were fermented SWW-based diet, fermented SWW 3 days, 5 days, 7 days and 9 days-based diet, as SWW-3, SWW-5, SWW-7 and SWW-9, respectively. The feed ingredients and composition of based diet were shown in Table 2.

Chicks were raised in 20 metabolic hermetic containers of cages equipped with feeder and drinker. Feed in collection period was collection and every day made available for ad libitum consumption. The composition of diet is shown in Table 1 and composition and balanced analysis of diet are shown in Table 3.

The lowest rate of excretion was exhibited by the birds fed diet containing SWW followed by the birds containing fermented SWW and 9 days. It means that the lower the rate of excretion of Ca and P. The result of the study revealed that the digestibility of mineral Ca and P were affected in the birds fed different time of fermentation of SWW. There was a corresponding increase in the mean digestibility values with increase the term of fermentation of SWW in the diet.

Cellulose in fiber produced the hulkier feed material and had the faster transit rate. This may indicate that cellulose affects absorption of nutrients mainly through increased bulkiness and decreased transit time will decrease the frequency of microbial interactions necessary for absorption. Nouri and Fischer (1996) and Schlotter (1990) reported that the inclusion of various fibres into the rat diets produced lower apparent availability of copper, iron, manganese, calcium and phosphorus. These increases were depending on the type of fiber added to the diet and the particular mineral measured. When increased transit time was observed and feed bulk was greater in comparison to the control diet, utilization of the minerals in the fiber matrix, mainly the feed in highest concentration in the germ and outer layers of the grain. With fermentation, the dietary fibre matrix is often almost or almost and more nutrients would release (Izzati, 1999) as a successfully yielded Ca and P and is a easily digestible.

Conclusion

From the analysis of Ca and P retention in soybean waste it is concluded that soybean waste fermented for 3, 5, 7, 9 days is suitable for laying hen production. Because, when used as a feed ingredient, it successfully yielded Ca and P and is easily digestible.

References
1. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

2. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

3. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

4. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

5. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

6. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

7. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

8. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

9. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

10. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

11. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

12. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

13. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

14. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

15. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

16. J. S. Manday, J. R. Lestari, A. Rahasia. 2019. Effect of soybean waste (SWW) fermented at several duration times by *Trichoderma reesei* in diet on calcium (Ca) and phosphorus (P) excretion and retention in laying hens. *Journal of Applied Animal Science* 1(1): 1-10.

Calcium and phosphorus excretion and retention in diets of laying hens fed soybean waste fermented by *Trichoderma viride*

ORIGINALITY REPORT

20%

SIMILARITY INDEX

15%

INTERNET SOURCES

13%

PUBLICATIONS

%

STUDENT PAPERS

PRIMARY SOURCES

1

www.tandfonline.com

Internet Source

1%

2

eprints.nottingham.ac.uk

Internet Source

1%

3

www.waset.org

Internet Source

1%

4

Campbell Leith. "Estimated Open Economy New Keynesian Phillips Curves for the G7", Open Economies Review, 06/19/2007

Publication

1%

5

www.cambridge.org

Internet Source

1%

6

www.coursehero.com

Internet Source

1%

7

js.bsn.go.id

Internet Source

1%

8

www.publish.csiro.au

Internet Source

1%

9

en.engormix.com

Internet Source

1%

10

mjas.my

Internet Source

1%

11

media.neliti.com

Internet Source

1%

- 12 William Narvaez-Solarte ., Horacio Santiago Rostagno ., Paulo Rubens Soares ., Luis F. Uribe-Velasquez ., Marcelo A. Silva .. "Nutritional Requirement of Calcium in White Laying Hens from 46 to 62 Wk of Age", International Journal of Poultry Science, 2006
Publication 1%
-
- 13 H Karunajeewa. "The effect of cockle-shell grit, dietary level of calcium and EDTA on eggshell quality and laying performance of crossbred hens", Australian Journal of Experimental Agriculture, 1978
Publication 1%
-
- 14 Yi-feng GONG, He-rong LIAO, Jin-fu WANG, Hong-yan LI. "Effect of Wheat Middlings, Microbial Phytase, and Citric Acid on Phytate-Phosphorus, Calcium, and Protein Utilization of Broilers", Agricultural Sciences in China, 2006
Publication 1%
-
- 15 efsa.onlinelibrary.wiley.com
Internet Source 1%
-
- 16 Zenon Zduńczyk, Jan Jankowski, Jerzy Juśkiewicz, Dariusz Mikulski, Bogdan A. Slominski. "Effect of different dietary levels of low-glucosinolate rapeseed (canola) meal and non-starch polysaccharide-degrading enzymes on growth performance and gut physiology of growing turkeys", Canadian Journal of Animal Science, 2013
Publication 1%
-
- 17 seer.sct.embrapa.br
Internet Source 1%
-
- 18 S Surtijono, R Tinangon, J R Leke, F N Sompie, Z Poli, R Siahaan. "The Development of Rural Poultry Farming Program to Kampong Chicken 1%

Farmers of Treman Village North Sulawesi", IOP
Conference Series: Earth and Environmental
Science, 2019

Publication

| | | |
|----|---|-----|
| 19 | www.lrrd.org Internet Source | 1% |
| 20 | www.archive.org Internet Source | <1% |
| 21 | lib.dr.iastate.edu Internet Source | <1% |
| 22 | journal.uin-alauddin.ac.id Internet Source | <1% |
| 23 | www.asfc-lapin.com Internet Source | <1% |
| 24 | Ashwitha Kodaparthi .. "INVITRO COMPATIBILITY EVALUATION FOR THE BIOCONVERSION OF DOMESTIC SOLID WASTES BY MIXED CULTURES OF MICRO- ORGANISMS", International Journal of Research in Engineering and Technology, 2015 Publication | <1% |
| 25 | link.springer.com Internet Source | <1% |
| 26 | Mabelle Chedid, Jean-François Tourrand, Lina S. Jaber, Shadi K. Hamadeh. "Farmers' perception to change and adaptation strategies of small ruminant systems in the West Bekaa of Lebanon", Small Ruminant Research, 2018 Publication | <1% |
| 27 | lrrd.org Internet Source | <1% |
| 28 | www.openagrar.de Internet Source | <1% |

| | | |
|----|--|-----|
| 29 | www.seedsofchange.com Internet Source | <1% |
| 30 | coek.info Internet Source | <1% |
| 31 | journal.ugm.ac.id Internet Source | <1% |
| 32 | www.fortunejournals.com Internet Source | <1% |
| 33 | www.innspub.net Internet Source | <1% |
| 34 | Patrick F. Varley, Bernie Flynn, James J. Callan, John V. O'Doherty. "Effect of crude protein and phosphorus level on growth performance, bone mineralisation and phosphorus, calcium and nitrogen utilisation in grower-finisher pigs", <i>Archives of Animal Nutrition</i> , 2011 Publication | <1% |
| 35 | www.i-scholar.in Internet Source | <1% |
| 36 | Latifa Mechkirrou, Mourad Arabi, Mohammed Ouhssine, Mohamed El Amine Afilal. "Food Waste reuse as a feed for organic chicken: A case study", <i>E3S Web of Conferences</i> , 2021 Publication | <1% |
| 37 | A.B Kasim, H.M Edwards. "Effect of sources of maize and maize particle sizes on the utilization of phytate phosphorus in broiler chicks", <i>Animal Feed Science and Technology</i> , 2000 Publication | <1% |
| 38 | Arif Mustafa. "Ensiling characteristics, nutrient composition, and in situ ruminal and whole tract degradability of brown midrib and leafy corn silage", <i>Archives of Animal Nutrition</i> , 10/1/2005 Publication | <1% |

39

Raciel J. Estrada-León, Juan G. Magaña-Monforte, José C. Segura-Correa. "Estimation of genetic parameters for preweaning growth traits of Brahman cattle in Southeastern Mexico", *Tropical Animal Health and Production*, 2014

Publication

<1%

40

Tjokorda I. Indira, Khairul Hadi Burhan, Robert Manurung, Ana Widiana. "Enhancement of Essential Oil Yield from *Melaleuca leucadendra* L. leaves by Lignocellulose Degradation Pre-treatment Using Filamentous Fungi", *Journal of Bioresources and Bioproducts*, 2021

Publication

<1%

41

Ghanaatparast-Rashti, Moein, Farid Shariatmadari, Mohamad Amir Karimi-Torshizi, and Maziar Mohiti-Asli. "Effects of dietary propionic acid, sodium citrate, and phytase on growth performance, mineral digestibility, and tibia properties in broilers", *Journal of Applied Animal Research*, 2016.

Publication

<1%

Exclude quotes Off

Exclude matches Off

Exclude bibliography Off