



**IJAIR**  
ONLINE ISSN : 2319 – 1473

# **International Journal of Agriculture Innovations and Research**



**[www.ijair.org](http://www.ijair.org)**



## AUTHOR'S CORNER

- › Paper Submission
- › Authors Guideline
- › Publishing ethics
- › Plagiarism Policy
- › Archive
- › Licences, Copyright, Permissions
- › Permission requests for Re-use
- › licence to publish
- › About Copyright
- › Deposition & sharing rights
- › Citations
- › Author's Right
- › Downloads
- › Topics
- › Waiver Policy
- › Indexing
- › Call for Paper
- › Why Open Access

## LATEST UPDATES

"Submissions Open For Vol. 10, Issue 5, Mar.- Apr. 2022"

**Successfully Published**

Volume 10, Issue 4, Jan.- Feb. 2022

**Submissions open**

Welcome to IJAIR  
Timeline Publication Pvt. Ltd.  
ISSN : 2319-1473  
NAAS Score : 3.99 (2016-2020)

ISSN : 2319-1473 , Publisher : Timeline Publication Pvt. Ltd.  
**NEW**  
IJAIR ICV : 80.67 IJAIR Impact Factor(UIF) : 1.1260

## International Journal of Agriculture Innovations and Research™

ISSN(Online):2319-1473

★ "Submissions Open For Vol. 10, Issue 5, Mar.- Apr. 2022", IJAIR NAAS Score : 3.99 (2016-2020)

IJAIR ( ICV : 80.67 ) is an international academic online journal which gains a foothold in India, Asia and opens to the world. It aims to promote the research the field of agriculture. The focus is to publish quality papers on state-of-the-art of Agriculture. Submitted papers will be reviewed by technical committees of the Journal and Association. All submitted articles should report original, previously unpublished research results, experimental or theoretical, and will be peer-reviewed. Articles submitted to the journal should meet these criteria and must not be under consideration for publication elsewhere. Manuscripts should follow the style of the journal and are subject to both review and editing.

**Frequency: 6 Issue per year**

**Status: Published Online**

**Subject Category :** IJAIR covers all the areas related to agriculture like (not limited to):

*Agronomy ,Agricultural Chemistry & Soil science ,Agricultural Botany & Biotechnology ,Bio Chemistry,Agricultural Entomology ,Plant Pathology ,Animal Science ,Agricultural Extension Education ,Agricultural Statistics ,Plant Breeding & Genetics...*

Send your paper at E-mail: [submit@ijair.org](mailto:submit@ijair.org) , [submit2ijair@yahoo.in](mailto:submit2ijair@yahoo.in)

(Authors are requested to send their papers to both above mentioned email addresses)

Final Paper Submission should be done at E-mail: [response@ijair.org](mailto:response@ijair.org) , [submit2ijair@yahoo.in](mailto:submit2ijair@yahoo.in)

Reviewer Response should be done at E-mail: [editor@ijair.org](mailto:editor@ijair.org)

Any Query response should be done at E-mail: [info@ijair.org](mailto:info@ijair.org) , [submit2ijair@gmail.com](mailto:submit2ijair@gmail.com)

"Submissions Open For Vol. 10, Issue 5, Mar.- Apr. 2022"



# Editorial Board



SUPER USER
 IJAIR PAGES
 23 NOVEMBER 2015
 HITS: 30459

## Editorial Board

## Editorial Board of IJAIR

Sr. No.	Editor name	Affiliation	E-mail Address
<b>Editor in Chief</b>			
1	Rtd. Prof. S.B.Nemade	Prof. and Head, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola,Ms.,India.	sbnemade17[at]gmail[dot]com
<b>Advisory Board</b>			
2	Mr. A.K. Chaudhari	Formar Research Fellow RRL, Bhopal,M.P.,India.	ashishkchaudhari12[at]gmail[dot]com
3	Smt.K.A. Chaudhari	Formar ADO Jabalpur Zone, M.P., India.	krantichaudhari03[at]gmail[dot]com
4	Dr. Mohammad Shamim	Scientist,Agricultural Meteorology,PDFSR,Modipuram, Indian Council of Agriculture Science (ICAR),New Delhi,India.	shamimagrimet[at]rediffmail[dot]com
5	Dr. SOUGATA BARDHAN	Post Doctoral Fellow, University of Missouri, Columbia.	bardhans[at]missouri[dot]edu
6	Dr. Sumanthkumar Venigalla	Scientist-ICT4D, Knowledge Sharing and Innovation,International Crops Research Institute for the Semi-Arid Tropics,ICRISAT, Patancheru, Andhra Pradesh, India 502324.	V.Sumanth[at]cgjar[dot]org
7	Dr. Vijay K Chaudhari	Prof.,TIT Group of Institutions,Bhopal, Madhya Pradesh, India.	vijay_ashish[at]yahoo[dot]com
<b>Legal Advisory</b>			
8	Advocate T.S.Nemade	Akola, Ms., India.	tushar.nemade[at]rediffmail[dot]com
<b>Editorial Board</b>			
9	Dr. R.G. Deshmukh	Rtd. Head, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola,Ms.,India.	rgdeshmukh70[at]gmail[dot]com
10	Dr.M.N.Nachne	Prof.,Head, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola,Ms.,India.	mnnachne[at]gmail[dot]com
11	Dr. Amar Ashok Bhopale	Assistant Professor (Ag,Economics) , Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola,Ms.,India.	amarb47[at]gmail[dot]com
12	Dr. Alihan Cokkizgin	Assist. Prof., Gaziantep University, Vocational School of Higher Education in Nurdagi, Turkey.	acokkizgin[at]hotmail[dot]com
13	Dr. Atul Vishnu Zope	Asst. Prof.,College of Agriculture, Akola, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola,Ms.,India.	azope[at]rediffmail[dot]com

14	Dr. Umesh G. Thakre	Krishi Vigyan Kendra Akola, Ms. India.	dr[dot]comumeshthakre[at]gmail[dot]com
15	Dr. Rosa Misso	Prof,Researcher in Economics and Rural Estimate of University of Naples Parthenope – Department of Economics,Aversa (CE) - Italy.	misso[at]uniparthenope[dot]it
16	Dr. Amol Anantrao Kulkarni	Assistant Professor,Dr. D. Y. Patil Institute of Pharmaceutical Sciences & Research, Pune,India.	amolkulkarni89[at]rediffmail[dot]com
17	Dr. Elsayed E. Hafez	Prof. of Molecular Biology Plant Protection and Bimolecular Diagnosis Dep., Arid Lands Cultivation Research Institute, City of Scientific Research and Technological Applications (SRTA)Research Area Borg El Arab, Postal Code 21934, Alexandria, Egypt..	elsayed_hafez[at]yahoo[dot]com
18	Dr. Aremu	Ass.Prof,Ladoke Akintola University of Technology, Ogbomoso, Nigeria.	arem_co[at]yahoo[dot]com
19	Dr. Alexander Vaninsky	Sc.D., Professor,Hostos Community College, CUNY,USA.	AVANINSKY[at]hostos[dot]cuny[dot]edu
20	Dr. Vahid Nourani	Visiting Associate Prof.,St. Anthony Falls Lab. and NCED ,Dept. of Civil Eng.,Univ. of Minnesota , USA ; and Associate Prof., Dept. of Water Resources Eng., Faculty of Civil Eng.,Univ of Tabriz,Iran.	vnourani[at]yahoo[dot]com
21	Dr. H. R. PATEL	Principal & Professor, Vidyabharti Trust Institute of Technology & Research Centre, Umrakh, Bardoli, Surat, Gujarat, India	dr[dot]comhrpatel[at]gmail[dot]com
22	Dr. J. Francis Borgio	Assistant Professor,Prince Mohammed Centre for Research & Consultation,KINGDOM OF SAUDI ARABIA.	borgiomicro[at]gmail[dot]com
23	Dr . Pankaj	Associate Professor & Research coordinator, ICFAI UNIVERSITY, Solan Himachal Pradesh -174103, India	pankaj_thakur15[at]yahoo[dot]co[dot]in
24	Dr. Farhad Mirzaei	Member of Department of Animal Production Management, Animal Science Research Institute of Iran	farmir2005[at]gmail[dot]com,
25	Dr. M. Ali Akbar	Associate Professor, Dept. of Applied Mathematics, University of Rajshahi, Bangladesh.	ali_math74[at]yahoo[dot]com
26	DR. Chee-Ming Chan	Senior Lecturer,Universiti Tun Hussein Onn Malaysia.	chan[at]uthm[dot]jedu[dot]my
27	Prof. Claver P. Bhunu	University of Zimbabwe,Harare,Zimbabwe.	cpbhunu[at]gmail[dot]com
28	Ass. Prof. Grigorios N. Beligiannis	Department of Business Administration of Food and Agricultural Enterprises,University of Western Greece,Greece.	gbeligia[at]uwg[dot]gr
29	Dr.Ajay Kumar Jha	State Key Laboratory of Urban Water Resources and Environment,Harbin Institute of Technology,China.	ajaykumar_521[at]yahoo[dot]com
30	Dr. Moinuddin Sarker	Vice President of R & D, Head of Science Team (VP and CTO),Natural State Research (NSR) Inc.,Stamford, CT,USA.	moinanju[at]gmail[dot]com
31	Dr. Hamad Attitalla	Associate Professor,Omar Al-Mukhtar University,Faculty of Science,Botany Department,Al-Bayda, Libya.	idressattitalla2004[at]yahoo[dot]com

32	Dr. Riti Thapar Kapoor	Assistant Professor,Amity Institute of Biotechnology,Amity University,Noida,Uttar Pradesh,India.	drriti_bhu[at]yahoo[dot]co[dot]in
33	Dr. Ali R. Bandani	Professor,Dept. of Plant Protection, College of Agriculture and NaturalResources,Iran.	abandani[at]ut[jac[dot]in
34	Dr. Ahmad Zuhairi bin Abdullah	Associate Professor / Deputy Dean,School of Chemical Engineering,Universiti Sains Malaysia,Malaysia.	azuhairi[at]yahoo[dot]com
35	Dr. Ashutosh Srivastava	Coordinator, Amity Institute of Marine Science and Technology and A.P.,Amity Institute of Biotechnology, Amity University U.P.,Noida,India.	asrivastava4[at]amity[dot]edu
36	Dr. David M. Onyango	Senior Lecturer, Department of Zoology, Maseno,University,Kenya.	dvdonyango7[at]gmail[dot]com
37	Dr. V.E.Nethaji Mariappan	Centre for Remote Sensing and Geoinformatics,Sathyabama University,Sholinganallaur,Chennai,Tamil Nadu,India.	nethajim[at]gmail[dot]com
38	(Dr.) Mohammad Shahid	Scientist (ICAR),Soil Science & Microbiology,Crop Production Division,Central Rice Research Institute,Cuttack,Orissa, India.	shahid[dot]vns[at]gmail[dot]com
39	Dr.Philippe Sessou	Specialization : Food and Industrial Microbiology,01BP 2009, Cotonou / Benin.	sessouphilippe[at]yahoo[dot]fr
40	Dr. M. N.Brahmbhatt	Prof. & Head,Dept.of Veterinary Public Health & Epidemiology,College of Veterinary Science & Animal Husbandry, Anand,Agricultural,University, Anand, India.	mnbrahmbhatt2003[at]yahoo[dot]com
41	Dr. Mohamed Zidan Mohamed Salem	Lecturer,Department of Forestry and Wood Technology, Faculty of Agriculture (El-Shatby), Alexandria University, Egypt.	zidan_forest[at]yahoo[dot]com
42	Dr. Rajnish Sharma	Asst. Prof.,Dept. of Biotechnology,Dr YS Parmar University of Horticulture & Forestry, Nauni, Solan 173 230 (HP) India.	rajnish[dot]comsharma[at]yahoo[dot]co[dot]in
43	Dr. Chinchmalatpure Umesh Ramkrishna	Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola Maharashtra,India.	rcumesh[at]rediffmail[dot]com
44	Dr. Wanying (Julia) Yao	Faculty,Biosystem and Agriculture Engineering Department, University of Kentucky, Lexington, KY.	yaowanying[at]gmail[dot]com
45	Dr. Mihir Kumar Mandal	Postdoctoral Associate, Dept. of Biochemistry, Virginia Polytechnic,Institute and State University, Blacksburg, Virginia.	mihir[dot]combiotech[at]gmail[dot]com
46	Dr. Pankaj Kumar Singh	Asst. Prof., Department of Animal Nutrition, Bihar Veterinary College, Patna, India.	vetpank[at]gmail[dot]com
47	Dr. Padmaja Nagabhyru	Research Associate,Department of Plant Pathology,University of Kentucky ,Lexington, KY.	Padmaja[dot]Nagabhyru[at]uky[dot]edu
48	Dr. Shahera zaitoun	Professor,Faculty of Agricultural Technology,Al-Balqa Applied University, Assalt,Jordan.	zaitoun[at]bau[dot]edu[dot]jo
49	Dr. Vishwanath, K	Assitant Professor in Dept. of Seed Science and Technology, University of Agricultural Sciences,Zonal Agricultural Research Station, VC,Farm, Mandya, Bangalore, India.	vishwakoti[at]gmail[dot]com
50	Dr. Melkamu Bezabih Yitbarek	Assistant Professor, Department of Animal Science, College of Agriculture and Natural Resources, Debre Markos University, Ethiopia.	tirumelk[at]gmail[dot]com
		Assoc. Prof. Dr. Faculty of Veterinary Medicine,	

51	Assoc. Prof. Dr. Bulent ELITOK	Assoc. Prof. Dr. Faculty of Veterinary Medicine, Department of Internal Medicine, Afyon Kocatepe University, Afyonkarahisar/Turkey.	elitok1969[at]hotmail[dot]com
52	Prof. Dr. Said Elshahat Abdallah	Professor of Agricultural Process, Engineering, Department of Agricultural Engineering, Faculty of Agriculture, Kafrelsheikh University, Egypt.	dr[dot]selshahat[at]gmail[dot]com
53	Dr. Guillermo Jimenez-Ferrer	Researcher Livestock and Climate Change, ECOSUR, Mexico.	gjimenez[at]ecosur[dot]mx
54	Dr.P.Muthukumaran	Senior Lecturer, (Institute of Virtual &Distance Learning), DMI St. Eugene University, P. O. Box: 330081, Plot No. B2029/M, 9 Miles, Great North Road, Chibombo, Zambia.	kumaran[dot]bio14[at]gmail[dot]com
55	Ibrahim Mehdi Yassin	College of Agriculture and Natural Resource, Department of Animal Science, Werabe University, Ethiopia.	mehdi[dot]ibrahim6[at]gmail[dot]com
56	Dr. Ghulam Abbas	Riphah College of Veterinary Sciences, Lahore, Pakistan.	ghulamabbas_hashmi[at]yahoo[dot]com
57	Dr. Lila B. Karki	College of Agriculture, Environment and Nutrition Sciences, Cooperative Extension Tuskegee University, Alabama, USA.	lkarki[at]tuskegee[dot]comedu
58	Dr Habib Ali	College of Plant Protection, Fujian Agriculture and Forestry University Fuzhou, China.	habib_ali1417[at]yahoo[dot]com
59	Dr. Kaveh Ostad-Ali-Askari	Civil Engineering, Postdoctoral Student of Civil Engineering, Department of Water Resources Engineering, Faculty of Civil Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Isfahan, Iran.	ostadaliaskarik[at]pci[dot]iaun[dot]ac[dot]ir
60	Dr. Muhammad Abid Hayat	Department of Veterinary Surgery, college of Veterinary Medicine, Northeast Agricultural University Harbin China.	abidbagra[dot]juvas[at]gmail[dot]com
61	Yimer Mihretie	Department of Food Science and Nutrition, College of Dryland Agriculture, Jigjiga University, Ethiopia.	luguy00[at]gmail[dot]com
62	Dr. Moustafa Mohamed Sabry Bakry	Plant Protection Research Institute Agricultural Research Center, Giza, Egypt.	md[dot]md_sabry[at]yahoo[dot]com
63	Prof. Dr. Saul Jorge Pinto de Carvalho	Federal Institute of Education, Science and Technology of the South of Minas Gerais - Brazil.	sjpcarvalho[at]yahoo[dot]com[dot]br
64	Dr. Samah Ben Chaaban	Regional Research Center on Oasis Agriculture Tozeur Road Km1, B.O 62, 2260 Degache Tunisia.	samah_bchaaban[at]yahoo[dot]fr
65	Dr. Hafiz Ishfaq Ahmad	Guangdong Institute of Applied Biological Resources, 105, Xingang Road, Guangzhou,	hafizishfaq93[at]outlook[dot]com

66	Dr. Xutong Wang	Department of Agronomy, Purdue University, USA.	wang3283[at]purdue[dot]edu
67	Dr. Deeksha Krishna	Assistant Professor, Department of Soil Science and Agricultural Engineering, College of Agriculture, Fisheries and Forestry, Koronivia Campus, Fiji National University, P.O. Box.1544, Nausori, Fiji Islands.	deeksha[dot]krishna[at]fnu[dot]ac[dot]fj
68	Assoc. Prof. Ionel BONDOC	University of Agricultural Sciences and Veterinary Medicine Iași, Department of Public Health, Faculty of Veterinary Medicine, ROMANIA.	bondoc_mv[at]yahoo[dot]com
69	Dr. Mehdi Jalali Jivan	Department of Food Science and Technology, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran.	mehdi[dot]jalali[dot]j1[at]gmail[dot]com
70	Dr. Gabriela Chiciudean	University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.	gabriela[dot]chiciudean[at]usamvcluj[dot]ro
71	Dr. Abubaker Haroun Mohamed Adam	Associate Prof. Department of Crop Science, College of Agriculture, University of Bahri-Sudan- Bahri El-Ingaz Street, West Railway – Sudan.	abubakerharoun[at]gmail[dot]com
72	Dr. Ammar Mohammed Hamood AL-Farga	Asst. Prof., Nutritional Sciences, Faculty of Agriculture, Department of Food Sciences and Technology University of Ibb, Yemen.	2259841993[at]qq[dot]com
73	Mrs. BAMISHAIYE Eunice Iyabode	Nigerian Stored Products Research Institute, Kano, Nigeria.	bamishaiyeunice[at]yahoo[dot]com
74	Ebrahim Azarpour	Society of Agronomy, Islamic Azad University of Lahijan, Iran and member of Young Researchers Club, Lahijan Branch, Islamic Azad University, Lahijan, Iran.	e786_azarpour[at]yahoo[dot]com
75	Dr.B.Samuel Masilamoni Ronald	Asst. Prof., Vaccine Research Centre-Bacterial Vaccines, Centre for Animal Health Studies, Tamilnadu Veterinary and Animal Sciences University, Chennai, India.	romasa68[at]yahoo[dot]com
76	Mr. Govinda BHANDARI	Chief, Research and Training, Environment Professionals Training and Research Institute (EPTRI), Pvt. Ltd., Nepal.	govindabhandari84[at]yahoo[dot]com
77	Mr.SarangSavalekar	(Pest Management Professional), Director, Paramount Pest Consultants Pvt. Ltd. (India).	savalekar_pestcon[at]yahoo[dot]com
78	Asst.Prof.LALA Iswari Prasad Ray	Researcher, PhD. (Integrated Water Management), IIT Kharagpur, India.	lalaiswariprasadray[at]yahoo[dot]co[dot]in
79	Mr. Som Pal Baliyan	Botswana College of Agriculture, University of Botswana, Gaborone, BOTSWANA (Southern Africa).	spbaliyan[at]yahoo[dot]com
80	Mr.Jiban Shrestha	Scientist (Plant Breeding and Genetics), Nepal Agricultural Research Council, National Maize Research Program, Rampur, Chitwan, Nepal.	jibshrestha[at]yahoo[dot]com

◀ Prev

Rating: ★★★★★ ☆



# Utilization of Duckweed in Feed Goats on Availability of Protein and Energy Balance

**\*Tintin Rostini, \*Achmad Jaelani, \*Irwan Zakir and \*\*Danang Diyamoko**

\* Study Program of Animal Science, Faculty of Agriculture,  
Islamic University of Muhammad Arsyad Albanjary Kalimantan  
Jl. Adyaksa no 2 Kayu Tangi Banjarmasin 70123, South Kalimantan, Indonesia  
\*\* Program Study of Animal Production, Faculty of Agriculture, Lambung  
Mangkurat University, A Yani Km. 36 Banjarbaru 70714,  
South Kalimantan - Indonesia

**Abstract** – Goat productivity is largely determined by the availability of cheap feed, available throughout the year and has a high quality. High quality feed into the primary feed source that can reduce feed costs. Purpose of this study is to investigate the use of aquatic weeds / duckweed into feed for protein and energy balance goats. The experimental design used was completely randomized design with 5 treatments with 3 replications, where each repetition consisted of 1 goats, so that the number of goats is 15 tail, where the study treatment consisted of: D1 = Grass field + (concentrates, 0 duckweed fermentation) D2 = grass field + (concentrate, 15% duckweed fermentation) D3 = grass field + (concentrate, 30% duckweed fermentation). D4 = (grass field + (concentrate, 45% duckweed fermentation). D5 = Grass field + (concentrate, 60% duckweed fermentation). Variables measured in: Observations in a cage experiment: Nutrient Consumption and digestibility of nutrients Nitrogen Balance and Energy Balance. The results showed the use duckweed to 45% in feed provide protein and energy balance in accordance required by goats. Concluded that the use of duckweed fermentation can increase the protein content of feed.

**Keywords** – Duckweed, Energy, Fermentation, Goats, Nitrogen.

## I. INTRODUCTION

Goat farm is now a promising business activities in addition to the price as well as goats market is still very open and met only 10%. Although goat is quite efficient in the use of feed, but the productivity of goats at the farmer level is still low. Goat productivity is largely determined by the availability of cheap feed, available throughout the year and has a high quality. High quality feed into the primary feed source that can reduce the cost of feed, because it can reduce the use of concentrate increased costs. Concentrate prices are high and increasing one of them caused by the use of imported raw materials such as wheat bran and soybean meal.. Efforts to use local food resources become crucial to increase production efficiency and reduce dependence on imports. One source of forage widely in the waters of Indonesia and has not been used as animal feed goats is water weeds of Family Lemnaceae ie duckweed.

Duckweed is one species of aquatic plants that grow in rivers, rice paddies, reservoirs or swamps. The existence of this plant is more often considered a weed that is very detrimental to humans because these plants can cause

silting of rivers or reservoirs and cause a reduction / evaporation of water and nutrient elements great.

The use of duckweed as a source of feed is the availability and development of the plant is quite a lot throughout the year in addition to nutrient content is also not good enough to compete with humans. Dried duckweed protein content is 25.2 - 36.5% and protein concentrations ranging between 37.5- 44.7%, the content of essential amino acids from protein concentrate better when compared to standard FAO except the amino acid methionine (Rusoff et al, 1990).

Balance Protein and energy for ruminants very important effect on the efficiency of microbes in the rumen, deciding the composition of weight gain, and the synthesis of long-chain fatty acids (Butler-Hogg and Crisckhshank, 1987). Manipulation of nutrients which significantly affect the balance of protein and energy that is absorbed by livestock (Soeparno and Davies, 1987). Thereby making it necessary to find a solution in the manipulation of nutrients for livestock in order to get the appropriate protein balance livestock needs.

Purpose of this study is to investigate the use of aquatic weeds / duckweed into feed for protein and energy balance goats.

## II. MATERIALS AND METHODS

Materials used are local goats aged one year as many as 15 tails, duckweed fermentation, field grass, rice bran and pulp, prepared rations isocaloric and isonitrogen. This study used male goat pea age 10-12 months as many as 15 tails with weight ranging between 11- 13 kg. Goat fold individual size of 1 mx 1.5 m as many as 15 pieces, while the tool used is a feed (basin), a bucket of drinking, and the label name.

The experimental design used was completely randomized design with 5 treatments with 3 replications, where each repetition consisted of 1 goats, so that the number of goats is 15 tail, where the study treatment consisted of: D1 = Grass field + (concentrates, 0 duckweed fermentation) D2 = grass field + (concentrate, 15% duckweed fermentation) D3 = grass field + (concentrate, 30% duckweed fermentation). D4 = (grass field + (concentrate, 45% duckweed fermentation). D5 = Grass field + (concentrate, 60% duckweed fermentation).

The ration given ad-libitum on all treatments based on the needs of dry matter as much as 3% goat BK. Ration



treatment is given twice a day, morning and afternoon at 08.00 hours 15.00. The rest of the weighed feed and drinking water were given ad-libitum. Variables measured in: Observations in a cage experiment: Nutrient Consumption and digestibility of nutrients **Nitrogen Balance and Energy Balance**.

**Nutrient digestibility:** the digestibility of nutrients is determined based on the difference of nutrients consumed by incurred in the stool. The content of nutrients determined by proximate analysis.

**The balance of protein and energy:** protein retention is determined based on the amount of protein consumption reduced the amount of protein that is released along with feces and urine, are stated in formula:

$$Rp \text{ (g/h)} = KP - (PF - PU)$$

Description :

RP = Retention protein

KP = consumption of protein

PF = protein in the stool

PU = protein in the urine (N uirin x 6:26)

While the Energy Balance is determined by the formula:

$$RE = (RL \times \text{fat retention}) + (Rp \times \text{Retention Protein})$$

Description :

RE = Retention energy

RL = fat retention (calculated based on changes in the body)

RP = Retention Protein

Energy fat = 0.03767 MJ / g

Energy Protein = 0.01674 MJ / g

#### Implementation:

All the goats were placed in individual cages type of stage as much as 15 plots to make it easier to observe. Placement of goats in a pen plots were randomized to receive treatment. Prior to conducting the animal studies are given time to adapt to the environment and feed for 2 weeks (14hari) with all experimental rations. All goats dibekai worming (panacur) during the previous adaptation research going all the goats were weighed weight to get data initial body weight. Do epilation, cutting nails and bathing cattle mixed with azuntol. Feeding time at 07.00 and 12.00 noon. Treatment of food remains weighed the next day to determine the consumption of these animals. Provision of drinking water continuously in cages in adlibitum.

Collection feces and urine is done for seven consecutive days after the observation period feed consumption and weight gain life ends. During the collection period cattle were placed in metabolic cages to reduce movement and ease in both feces and urine collection. Feces and food remains weighed every morning before the cattle fed. 10% of samples taken and dikomposit then stored in plastic bags and stored in the refrigerator prior to analysis. BK content analysis, ash, N, fat, and fiber using a procedure AOAC (2005).

Data were analyzed using analysis of variance. If there is a real difference then continued with Duncan test Mean Difference (DMRT) according to Steel and Torrie (1991).

### III. RESULTS AND DISCUSSION

#### *Type Feed on Consumption and Nutrient digestibility At Goats*

Livestock productivity is determined by the amount of feed consumed and digested by an animal. Consumption and feed digestibility is influenced by the quality of feed, palatability, digestibility and nutrient consumption average of each treatment are presented in Table 1.

Dry matter intake in this study (Table 1) ranged between 414-498 g / head / day. Meanwhile, according to Devendra & McIerroy (1982) needs dry matter goat weighing 15-17 kg is 396-424 g / head / day, so the results have met the need for consumption of BK goats. BK on perlakuan D4 consumption of 498 g / head / day higher ( $P < 0.05$ ) of treatment D1, D2, D4 D5 maupun. This shows that the addition of fermentation duckweed plants as much as 45% of the feed can improve feed intake, this is purportedly due fermented feed can improve performance in the rumen microbes digest the feed consumed host. The addition of concentrates and fermented duckweed 45% can increase the consumption of protein are better at treatment D4, it is suspected to contribute energy and balance the concentration of ammonia and VFA in the rumen so that the performance of rumen microbes can be optimized (Rostini et al 2014), whereas (Yusran & Teleni, 2000: Satter & Slyter 1974) states that the growth and activity of rumen microbes is dependent upon the availability of N in the form of ammonia and energy (Rostini and Zakir, 2010). With the increase in the number of rumen microbial population there will be an increase in the process of fermentation in the rumen of cattle feed which is manifested by increasing feed digestibility and dry matter intake of feed. The ability of ruminants to consume food is influenced by genetic factors, environment, production levels, age and health of livestock, while the factors of feed that the frequency of administration and nutrition (Siregar 1994).

The average protein consumption ranged from 60-76 g / head / day. Total consumption of the treatment have exceeded adequacy standard crude protein requirement is based on body weight is 56-58 g / head / day (NRC 2006). Consumption highest protein at treatment (D4), it is influenced by the dry matter intake of feed, but it is supported by nutrients ration treatment where dietary protein D4 reached 14.7% in the form of duckweed fermentation and has a fiber content ration reaches 17:43% so that the protein consumption is higher and more efficient. Bamualim (1988) say that protein is an essential nutrient for the body of livestock and the availability of adequate protein will increase the activity and growth of microorganisms so that the digestive process and also increases consumption. Further Rostini et al., (2014) states the amount of crude protein intake affected the rate of degradation, where the faster destruction of food more easily livestock hungry and consume more food. While Sunarso (2012) proteins needed for basic life greatly depends on the type of ration, quality protein, energy levels and condition of livestock.

Digestibility of nutrients is one measure in determining the quality of feed ingredients, as well as the contribution of a feed for cattle (Despal and Permana, 2008). Dry matter digestibility of feed containing forages marsh in this study ranged between 65% - 74% (Table 1). The highest digestibility in treatment by the fermentation of duckweed as much as 45% (D4) than the treatment (D5) but not significantly different ( $P < 0.05$ ) when compared to treatment D1, D2 and D3. These results are not much different from the research Wirawan et al. (2012) reported that dry matter grass field goat given by 64.6 - 68.5%. and research Rostini et al., (2014) goats fed fermented dry matter digestibility reaches 65% -77%, and the protein digestibility of 65% - 68%.

#### *Protein Balance*

The digested proteins are degraded Posted Livestock goat being several components including degraded hearts feces, urine and Its amino acids are absorbed being on feed the goats. Mean protein feces, urine protein and protein debt plus presented in table 2.

The balance of proteins in this study showed significant differences among treatments. wherein the D4 treatment showed the highest difference in both the urine protein or protein stool. This shows the amount of undigested protein are metabolized in the body of cattle to produce weight gain. Wherein the feed contains a lot of organic material that is easily metabolized.

#### *Energy Balance*

Goats growing requires more energy, which can be ingested energy that is wasted in the urine and gas (methane), while others belong to the energy metabolized. In this study ranged anatar energy undigested 6:23 to 7:13 MJ / day (Table 3), with the average energy consumption of 10:23 to 11:03 g / day (Table 1).

Energy balance in this study showed no significant differences among the treatments. this is where the energy balance shows the amount of energy that are metabolized in the body undigested cattle to produce weight gain. Wherein the feed contains a lot of organic material that is easily metabolized. In this study, the energy balance ranged between 86.51-86.88%, according to the research hail astute opinion (1995) that the balance of energy in growing goats ranged between 84-86%.

### **IV. CONCLUSION**

Duckweed plants can improve the quality of feed thereby increasing consumption and digestibility as well as the balance of protein and energy feed for goats.

### **V. ACKNOWLEDGEMENT**

The authors would like to thank directorate general of higher education, research and community service department that has provided funding of this research by competitive grants program by 2014.

### **REFERENCES**

- [1] Bamualim, A. 1994. Usaha Peternakan Sapi Bali di Nusa Tenggara Timur. Prosiding Seminar Pengolahan dan Komunikasi Hasil-Hasil Penelitian Peternakan dan Aplikasi Paket Teknologi Pertanian. Sub Balai Penelitian Ternak Lili/Balai Informasi Pertanian Noelbaki Kupang 1 – 3 Pebruari 1994. hlm. 17 – 26.
- [2] Church DC, 1991. Digestive Physiology and Nutrition of Ruminant Ed ke-12 Oxford Press. Inc. Portland. Oregon.
- [3] Despal, Permana IG. 2008. Penggunaan berbagai teknik preserves unstuck optimalisasi pemanfaatan daun rami sebagai hijauan sumber protein dalam ransum kambing Peranakan Etawah. Laporan Hibah Bersaing. LPPM. Institut Pertanian Bogor, Bogor,
- [4] Leng RA, Stambolie JH, and Bell R. 1998. Duckweed - a potential high-protein feed resource for domestic animals and fish. Nutritional Research Reviews. 3:277-303
- [5] National Research Council. 1985. *Nutrient Requirement of Sheep*. Washington DC: National Acad Press.
- [6] Rostini T Dan Zakir M I. 2010. Kajian Mutu silase Ransum Komplit Berbahan Baku lokal untuk memperbaiki performance dan kualitas daging kambing. Uniska KalSel.
- [7] Rostini T, and Zakir I. 2012. Evaluation of Complete Ration Silage on Performance and Quality of Goat Meat. Proceeding of the 2nd International Seminar on Animal Industry | Jakarta, 5-6 July 2012
- [8] Rostini T, L Abdullah, K. G. Wiryawan, P. D. M. H. Karti. 2014. Utilization of Swamp Forages from South Kalimantan on Local Goat Performances. Journal Media Peternakan. Vol 37(1):50-55
- [9] Rusoff L L, Blackeney EW and Culley DD. 1990 Duckweeds (Lemnaceae Family): a potential source of protein and amino acids. Journal of Agriculture and Food Chemistry. 28:848-850
- [10] Siregar SB. 1996. *Pengawetan Pakan Ternak*. Jakarta: Penebar Swadaya.
- [11] Sunarso. 2012. The effect of king grass silage on the nitrogen balance and hematological profile of geade male goat. J. of Science and Eng. 3(1):13-16
- [12] Steel RGD, dan Torrie JH. 1999. Statistics Principles and Procedures. 2<sup>nd</sup>. Translation: B. Sumantri. PT Gramedia Pustaka Utama. Jakarta.
- [13] Toharmat T, Nursasih E, Nazilah R, Hotimah N, Noerzihad TQ, Sigit NA, Retnani Y. 2006. Sifat fisik pakan kaya serat dan pengaruhnya terhadap konsumsi dan kecernaan nutrient ransum pada kambing. J. Media Peternakan. 29:146-154
- [14] Wirawan IW, Mudita IM., Cakra IG, Witariadi NM, dan Siti N. 2012. Kecernaan nutrien kambing Kacang yang diberi pakan dasar rumput lapangan di suplementasi dengan dedak padi. J. Wartazoa. 22(2):169-177
- [15] Yusran, M.A. and E. Teleni. 2000. The effect of a mix of shrub legumes supplement on the reproductive performance of Peranakan Ongole cows on dry land smallholder farms in Indonesia. Proc. of Ninth Animal Science Congress of the Asian-Australian Association of Animal Production Societies and Twentythird Biennial Conference of the Australian Society of Animal Production.

Table 1. Effect of treatment of feed intake and digestibility of feed  
(g / head / hr)

Parameter	D1	D2	D3	D4	D5	EM
Consumption.g/ ekor/hr	423.23	449.12	414.34	498.12	465.05	33.66
Dry Matter						
Crude Protein	60.87	62.11	65.23	76.12	66.24	6.01
Crude fiber	59.13	60.06	62.15	73.21	64.23	5.64
Crude fat	24.05	24.58	26.76	29.32	27.41	2.15
Energy	10.23	10.46	10.85	11.03	10.93	0.34
digestibility Nutrient (%)						
Dry Matter	65.75	69.66	70.16	74.52	73.43	3.46
Crude Protein	81.41	81.34	83.52	85.75	82.75	1.81
Crude fiber	22.13	23.42	23.64	24.01	23.87	0.75
Crude fat	68.75	67.98	68.92	71.09	70.64	1.33
Energy	59.01	59.34	60.05	61.12	60.83	0.91

Remarks: D1 = Grass field + (concentrates, 0 duckweed fermentation), D2 = Grass field + (concentrate, 15% duckweed fermentation) D3 = grass field + (Concentrate, 30% duckweed fermentation), D4 = (grass field + (concentrate, 45% duckweed fermentation), D5 = Grass field + (concentrate, 60% duckweed fermentation), different superscript on the line each show a significantly different effect (P <0.05)

Table 2. Mean Protein Balance (kg / day / head)

Variable	D1	D2	D3	D4	D5	EM
Feces Protein	17.41a	17.99	18.86	22.06	19.16	1.80
Urine Protein ( n x 6.25)	20.12	20.79	21.81	25.49	22.13	2.07
Protein Retention	22.47	23.22	24.34	28.46	24.72	2.31

Remarks: D1 = Grass field + (concentrates, 0 duckweed fermentation), D2 = Grass field + (concentrate, 15% duckweed fermentation) D3 = grass field + (Concentrate, 30% duckweed fermentation), D4 = (grass field + (concentrate, 45% duckweed fermentation), D5 = Grass field + (concentrate, 60% duckweed fermentation), different superscript on the line each show a significantly different effect (P <0.05)

Table 3. Mean Energy Balance (MJ / day)

Parameter	D1	D2	D3	D4	D5	Em
undigested energy	6.23	6.53	6.86	7.13	6.92	0.35
Urine Energy	0.84	0.87	0.9	0.94	0.91	0.04
energy termetabolis	5.39	5.66	5.96	6.19	6.01	0.32
heat production	4.62	4.64	4.65	4.67	4.66	0.02
Retention Energy	0.77	1.02	1.31	1.52	1.35	0.30
Balance Energi (%)	86.51	86.67	86.88	86.81	86.84	0.15

Remarks: D1 = Grass field + (concentrates, 0 duckweed fermentation), D2 = Grass field + (concentrate, 15% duckweed fermentation) D3 = grass field + (Concentrate, 30% duckweed fermentation), D4 = (grass field + (concentrate, 45% duckweed fermentation), D5 = Grass field + (concentrate, 60% duckweed fermentation), different superscript on the line each show a significantly different effect (P <0.05)

## AUTHOR'S PROFILE



### Dr. Tintin Rostini, Spt.MP

born in Tasikmalaya, West Java, Indonesia. Education Diploma programmed taken Dairy Cattle Business Technician studies at the Polytechnic Faculty of IPB, graduating in 1991. In 1993 the author continued studies degree (S1) taken in Program Animal Production, Faculty of Agriculture, Bogor Juanda University, graduating in 1995. the author received in Agronomy program. Mangkurat graduate University in 2004 and finish it in 2006, then in 2011 the author went on to study S3 at Bogor Agricultural University (IPB), Department of Nutrition Feed and graduated in 2014. The author worked as a lecturer at the Faculty of Agriculture, University of Islam Kalimantan, since 1999 until now.

### Dr. Tintin Rostini, Spt.MP

born in Tasikmalaya, West Java, Indonesia. Education Diploma programmed taken Dairy Cattle Business Technician studies at the Polytechnic Faculty of IPB, graduating in 1991. In 1993 the author continued studies degree (S1) taken in Program Animal Production, Faculty of Agriculture, Bogor Juanda University, graduating in 1995. the author received in Agronomy program. Mangkurat graduate University in 2004 and finish it in 2006. then in 2011 the author went on to study S3 at Bogor Agricultural University (IPB), Department of Nutrition Feed and graduated in 2014. The author worked as a lecturer at the Faculty of Agriculture, University of Islam Kalimantan, since 1999 until now.

### Dr. Ahmad Jaelani, Spt.MSi:

Education S3 from Bogor Agricultural Institute. Worked as a lecturer at the faculty of Agriculture, University of Islam Kalimantan Muhammad Arsyad Albanjary.

### Ir. Muhammad Irwan Zakir, MP.

Magister (S2) education from the University of Hasanuddin Makassar. Worked as a lecturer at the Faculty of Agriculture, University of Islam Kalimantan Muhammad Arsyad Albanjary.

### Prof. Dr. Ir. Danang Biyatmoko, MSi

S3 education from Bogor Agricultural Institute. Worked as a lecturer at the Program Study of Animal Production, Faculty of Agriculture, Lambung Mangkurat University, South Kalimantan - Indonesia