ISBN 978-979-17677-1-2

MANAGEMENT STRATEGY OF ANIMAL HEALTH AND PRODUCTION CONTROL ON ANTICIPATION GLOBAL WARMING FOR ACHIEVEMENT OF MILLENNIUM DEVELOPMENT GOALS

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COLLABORATION OF :

FACULTY OF VETERINARY MEDICINE
AIRLANGGA UNIVERSITY

FACULTY OF VETERINARY MEDICINE
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Faculty of Veterinary Medicine
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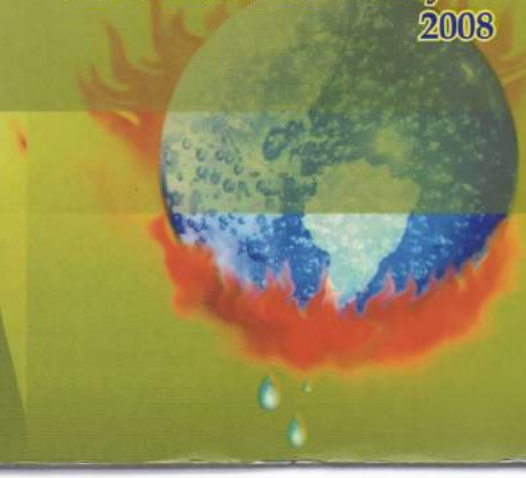
Faculty of Veterinary Medicine
Universiti Putra Malaysia
2008



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CERTIFICATE

this is to certify that

Dr. Sri Hidanah, M.S., Ir.

has participated in

International Seminar

Management Strategies on Animal Health and Production Control in The Anticipation of Global Warming for The Achievement of Millennium Development Goals

As

speaker

3th – 4th June, 2008, Surabaya - Indonesia

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PENERBIT DANI ABADI
Surabaya

Cetakan pertama 2008

REPORT OF ORGANIZING COMMITTEE

Global warming is creating a threat of disaster in animal husbandry sector in the form of decreasing livestock productivity. From the aspect of animal health global warming has the opportunity to change the character of the existing diseases agent. It is possible that a mutation occurs and causes microorganisms those are normally non-infectious becomes infectious. On the other hand global warming has indirect impact on livestock feed industry. Further impact of global warming causes the availability of animal derived food products decrease and eventually affect human life due to the lack of animal derived food material supply qualitatively and quantitatively. One of the efforts solves the problem is with the performed International Seminar entitled "The Management Strategies of Animal Health and Production Control in the Anticipation of Global Warming for the Achievement of Millennium Development Goals" at 3-4 June 2008 in ELMI Hotel Surabaya. Ideas on the process and steps need to be taken to overcome the impact and to anticipate global warming presented in the International Seminar were compiled into this proceeding. It is expected that this proceeding could help in solving and anticipating global warming to achieve millennium development goals. Thank you is directed to all who participated in the International Seminar, especially the oral as well as the poster presenters.

Surabaya, 20 June 2008

Chairman of the committee
Dr. Koesnoto Supranianondo MS., Drh.

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POSTER

UTILIZING OF CELLULOLYTIC BACTERIUM AND CELLULOLYTIC FUNGI FROM GIRAFFE'S FECES AS AN INOCULUM TO INCREASE THE QUALITY OF RICE STRAW

Sri Hidanah
Department of Animal Husbandry, Faculty of Veterinary Medicine - Airlangga University

ABSTRACT

The research aimed to conduct the isolation of cellulolytic bacterium and cellulolytic fungi from giraffe's faeces, by selecting the cellulolytic bacteria and cellulolytic fungi, the to identify isolation and chosen the isolate of cellulolytic bacterium and the best cellulolytic fungi to be used on fermentation of rice straw.. The research was divided into 2 phases. The research including (a) isolation of cellulolytic bacterium and cellulolytic fungi, taken from the faeces of *giraffe* from Safari Park of Pandaan East Java, (b) selecting the isolates by conducting a test of the rice straw's fermentation. The best fungi and bacteria selected against the lowest crude fibre content and the highest crude protein. The data analyzed by the Variant Analysis and for the difference of mean among treatment, tested with the Duncan's Multiple range Test. The results of the first phase research were (a) for the isolation obtained 4 isolate of cellulolytic bacterium that were: *Acidophilium facilis, Acetobacter liquefaciens, Cellulomonas Sp, and Acenitobacter sp.* Two isolates of cellulolytic yeast were *Geotrichum sp, and Cryptosporium Sp.* (b) The chosen selection for the isolate of bacterium was *Acetobacter liquefaciens*, and for the isolate of yeast was *Geotrichum sp*

Keywords : Giraffe's faeces, cellulolytic bacterium and cellulolytic fungi, Quality of rice straw.

INTRODUCTION

Giraffe (*giraffa camelopardalis*) is include in sub order ruminant, with a bounce that consist of four parts. Giraffe has digestion system with high efficiency, because its bounce has many long papillas, also, has expanse area to absorb the food. Tall giraffe neck, allowed it to achieve tall crotch, and consume from bud, leaf, twig, even to eat hard plant and thorny without difficulty (Ginnet, 1997; Kingdon, 1997 and Yahya, 2004). Based on its ability to consumes food with coarse fiber tall, it is very possible that insides rumen and digestion system of Giraffe has microbial cellulolytic which so potential to help it digesting woof ingredient as their food.

Omed *et al.* (2000) said that feces are guessed containing microbe that comes from rumen, therefore feses can be used as an alternative source to supplying microbe. According to Manyuchi *et al.* (1991), inoculum from faeces can be used as stipulating estimation wild animal's digestibility which the rumen's liquid is not possible to be taken as sample because of the limitedness on fistula product. Antari (2004), declare that feces goat and sheep can replace rumen's liquid as microbe source in digestibility in vitro fibrous woof test.

Agriculture waste existence shaped rice straw, very overflow at the harvest time, but, as feed, rice straw has many deficits because its protein degree are low with high level of crude fiber. According to Soejono (1995), crude fiber that existing in straw is achieving 20 - 41,5 % dry matter, while its crude protein degree is very low, 3 - 5 % dry matter, so that it is difficult to supposing it to fulfill main alive need for protein. Livestock feed ingredient that contain crude protein smaller than 7% causes microbe activities rumen retarded, because of its deficiency of nitrogen element so that carbohydrate utilization by microbe rumen is not maximal (Crowder and Chedda, 1992).

To reduce coarse fiber degree in straw, the role of livestock feed technology are so important. Cellulolytic bacteria and cellulolytic fungi as inoculum utilization were supposed to reduce crude fiber, it is because cellulolytic bacteria and cellulolytic fungi can produce cellulose enzyme that impersonate in cellulose fission.

This research aimed to conduct the isolation of cellulolytic bacterium and cellulolytic fungi from giraffe's feces, also using the isolation of cellulolytic bacterium and cellulolytic fungi as inoculum to increasing the rice straw quality.

MATERIALS AND METHODS

Testing cellulolytic bacteria isolate of giraffe's feces in rice straw

Cellulolytic bacteria isolate result from giraffe's feces is got as much as four isolat, that is bacteria isolate 1: *Acidophilium facilis*, bacteria isolate 2: *Acetobacter liquefaciens*, bacteria isolate 3: *Cellulomonas* sp, and bacteria isolate 4: *Acenitobacter* sp.

This research is using random sampling methods complete with 5 treatments and every treatment is done in 6 repetitions. The treatments are: B0: rice straw + 3% molassis + 3% urea + without isolate; B1: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 1; B2: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 2; B3: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 3; B4: rice straw + 3% molassis + 3% urea 5% bacteria suspension 4

Testing cellulolytic fungi isolate of giraffe's faeces in rice straw

Cellulolytic fungi isolate result from giraffe's feces consisted of two cellulolytic fungi isolate. Based on the identification test result, the cellulolytic fungi from giraffe's feces is isolate 1: *Khamir geotrichum* sp, while isolate 2: *Cryptosporidium* sp.

This research uses random plan, complete with 4 treatments and every treatment is done in 6 repetitions. The treatment are: J0: rice straw + 3% molasses + 3% urea + without isolate; J1: rice straw + 3% molasses + 3% urea + 5% fungi suspension 1; J2: rice straw + 3% molasses + 3% urea + 5% suspension fungi 2

Thirty samples of rice straw which already cut in to pieces, each weighing 200 gram, divided at random into 5 treatments with 6 repetition times, for testing cellulolytic bacteria isolate. While for testing cellulolytic fungi isolate used 18 samples of rice straw, each 200 gram, divided at random into 3 treatments and 6 repetitions.

Rice straw which has been mixed with 3% urea that melted in water, 3% molasses also given 5% bacteria suspension or fungi cellulolytic (10^8 /cc) appropriate to the treatment. Furthermore, the rice straw is putted into plastic pocket that staved in some places and fermentation during 7 days. After the fermentation process end, done measurement pH, then the rice straw is aerated. Furthermore, to detect dry matter contents, crude fiber, and crude protein, done proximate analysis based on some methods that suggested by Wendee (Tillman *at al.*, 1991).

Data that got from each variable has been analyzed by using analysis method variant figured complete random plan and average difference between treatment is tested with duncan`s multiple range test method (Steel and Torrie, 1995).

RESULTS AND DISCUSSION

Cellulolytic bacteria isolate of giraffe's feces in rice straw test

Crude Based on analysis of variant result knowable that dry ingredient contents of fermentation rice straw with cellulolytic bacteria isolate suspension show some result which is not differ real ($P>0.05$), while Crude fiber contents and Crude protein show different result ($P<0.05$), lit can seen in table 3.

Table 3. Average and Contents Deviation Standard of dry matter (%), crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic bacteria suspension

Treatments	dry matter (%)	Crude fiber (%)	Crude protein (%)
B0	89.87 ± 0.26	35.33^{e} ± 0.28	7.19^{a} ± 0.17
B1	89.99 ± 0.22	33.77^{d} ± 0.36	7.81^{b} ± 0.12
B2	90.08 ± 0.30	25.58^{a} ± 0.48	8.08^{c} ± 0.32
B3	89.90± 0.45	30.27^{b} ± 0.21	7.24^{a} ± 0.18
B4	90.06 ± 0.19	32.86^{c} ± 0.39	7.26^{a} ± 0.22

Different superscript in the same column show real difference ($p<0.05$)

The result from Duncan's multiple range test towards crude fiber content shows that bottom most crude fiber contents ($p<0.05$) is got in treatment B2 that is as big as 25.58%, and so do for highest crude protein contents ($p<0.05$) that is 8.08 %, get in treatment B2.

For crude fiber degree depreciation, *Acetobacter liquefaciens* bacteria isolate give highest crude fiber degree depreciation, and successive followed by *Cellulomonas* sp., *Acenitobacter* sp, and *Acidophilium facilis* bacteria isolate with bottommost depreciation in treatment without uses bacteria isolate. crude fiber degree depreciation in this cellulolytic bacteria suspension extending compared with control, show that cellulolytic bacteria that given were supposed to has an ability to produced enzyme celulase that can reduce organic ingredient especially cellulose. According to Bisaria and Ghose (1981), cellulolytic bacteria, minimal, produce two enzyme units sellulase that is enzyme endo-β -1,4 -glukanase that play a part in hydrolyzing cellulose fiber as short chain, then continued by enzyme exo- β -1,4 -gluconase which smashing short chain which is become an simple dissolved compound. Enzyme endogluconase and exogluconase are synergism in degradation cellulose (Schuller, 1980).

Acetobacter liquefaciens bacteria isolate obviously has highest ability to degrading rice straw coarse fiber compared with other bacteria isolate, also, control. This ability is possible to happen because *Acetobacter liquefaciens* bacteria isolate producing enzyme cellulase, more optimal compared with control and also other isolate. Bacteria ability in degrading cellulose is depend on cellulase enzyme activity that produced.

Acetobacter liquefaciens bacteria, based on identification test is able to fermenting sugar better than other isolate. According to Holt *et al.* (1994), *Acetobacter liquefaciens* bacteria is belong to stick form bacteria, the characteristic is gram negative, aerobic, can grow in the air, found in soil, fresh water, sea water, in the root or reproduction organ, human digestion channel and animal. Pelczar and Chan (1988), declare that the characteristic of genus bacteria *Acetobacter* is chemoorganotrof, oxidizing ethanol become sour acetate, grow in simple and complex medium, and can grow in temperature 5°C until 42°C.

Acetobacter liquefaciens bacteria isolate obviously also give highest influence in increasing th contents of rice straw coarse protein, followed by bacteria *Acidophilium facilis*, bacteria *Cellulomonas* sp. , and *Acenitobacter* sp. not differ real compared with control. Based on urea hydrolysis test, acetobacter liquefaciens bacteria can produce enzyme urease, so that it can change urea become amonia and CO2. Amonia, besides can increase ph, together with sour alpha keto by enzyme microbial will changed into amino source, and this amino sour by enzyme microbial will changed into protein microbial (Tillman, *et al.*, 1991).

Increasing urea as N source from NPN and molasses as energy distributor for cellulolytic microbe in this rice straw fermentation, more help the cellulolytic bacteria to growth and do their activities optimally. According to Hartiko (1991), ph 6-7 with temperature 38-42°C, is a fit environment for cellulolytic bacteria to degrading feed. Microbe growth will be better in media that contains complex cellulose than pure cellulose, because beside cellulose as C source, its also need enough some N source.

Cellulolytic fungi isolate of giraffe's feces in rice straw test

Based on the variant analysis result knowable that the contents of dry ingredient, coarse fiber and coarse protein in the fermentation rice straw with cellulolytic fungi isolate suspension show result differ real ($P<0.05$), seen in table 4.

Duncan test result towards dry ingredient feed shows that highest content of dry matter ($p<0.05$) is got in treatment J1 that is as big as 90.19%, for crude fiber and crude protein content is got result that treatment J1 has bottommost crude fiber content that is 26.43% and highest protein that is 8.28%.

Table 4. Average and Contents Deviation Standard of dry matter(%), crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic fungi isolate suspension

Treatments	Dry matter (%)	Crude fiber (%)	Crude Protein (%)
J0	$89.87^{a} \pm 0.26$	$35.33^{c} \pm 0.28$	$7.19^{c} \pm 0.17$
J1	$90.19^{ab} \pm 0.20$	$26.43^{a} \pm 0.55$	$8.28^{a} \pm 0.19$
J2	$90.04^{b} \pm 0.20$	$29.93^{b} \pm 0.24$	$7.89^{b} \pm 0.32$

Different superscript in the same column show real difference ($p<0.05$)

Based on bacteria and fungi cellulolytic isolate test result in rice straw fermentation likes on, so best bacteria isolate is got in treatment B2 that is *Acetobacter liquefaciens* bacteria isolate. While the best fungi cellulolytic are got in treatment J1 that is *Khamir geotrichum* sp. isolate.

Extending fungi isolate in rice straw fermentation obviously can reduce crude fiber contents and increasing the content of crude protein. Fungi don't have chlorophyll therefore, its characteristic is heterotropic. Fungi get the food by absorbing food molecule from iys environment, with digest in advance, with excretion enzymes hidrolytic extracellular (Kimball, 1999). Accoding to Presscott *et al.* (2003), fungi growth good in moist environment, but also can grow in organic matter, and fungi removes exo-enzyme hidrolytic that digest the substrate external and using the organic matter as carbon source, electron and energy.

Water and molasses distribution in rice straw fermentation, make environment damper and available energy source, causes growth and make the fungi activity more optimum. Fungi produce diverse cellular extra enzyme especially oxydase and hydrolase, and can using substrate organic include cellulose, hemicellulose, chitin, and lignin in its alive (Wainwright, 1992).

Suspension *Khamir geotrichum* sp. Isolate extending, give result better in crude fiber degree depreciation and increase crude protein compared with extending fungi *Cryptosporium* sp. Isolate. According to Piegza *et al.* (2005), *Geotrichum* sp is a fungi that produce enzymes celulase, xilanase, β -1,3-glukanase β -1,4-gluconase which able to degrading cellulose. Enzyme is protein that produced by alive cells and used as specific chemistry reaction catalyst. Fungi excretion enzymes hidrolytic extracellular (Kimball, 1999), and cellular extra enzyme is enzyme which excretion to its media environment as catalyst as catalisator of hydrolysis process.

CONCLUSIONS

Extending cellulolytic bacteria isolate suspension of giraffe's feses in rice straw can reduce crude fiber degree and increase crude protein degree of rice straw, and from four cellulolytic bacteria isolate which can be isolate successfully, *Acetobacter liquefaciens* bacteria isolate give the best result Extending cellulolytic fungi isolate suspension of giraffe's feces in rice straw can reduce crude fiber degree and increase crude protein degree of rice straw, and from two cellulolytic fungi isolate which can be isolate successfully, *Geotrichum* sp. isolate give the best result

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UTILIZING OF CELLULOLYTIC BACTERIUM AND CELLULOLYTIC FUNGI FROM GIRAFFE'S FAECES AS AN INOCULUM TO INCREASE THE QUALITY OF RICE STRAW

Sri Hidanah

Faculty of Veterinary Medicine
Airlangga University

INTRODUCTION

Giraffe (*giraffe camelopardalis*) is include in sub order ruminansia, with a bounce that consist of four parts. Giraffe has digestion system with high efficiency, because its bounce has many long papillae, also, has exposure area to absorb the food. Tall giraffe neck, allowed it to achieve tall crotch, and consume from bud, leaf, twig, even to eat hard plant and thorny without difficulty (pinnet, 1997; kingdon, 1997 and yahya, 2004). Based on its ability to consumes food with coarse fiber tall, it is very possible that insides rumen and digestion system of Giraffe has microbial cellulolytic which so potential to help it digesting woof ingredient as their food.

AIMS :

The research aimed to conduct the isolation of cellulolytic bacterium and cellulolytic fungi from giraffe's faeces, then selecting the cellulolytic bacteria and cellulolytic fungi, to identify isolation and choose the isolate of cellulolytic bacterium and the best cellulolytic fungi to be used on fermentation of rice straw.

MATERIAL AND METHOD

1. Testing cellulolytic bacteria isolate of giraffe's faeces in rice straw

Cellulolytic bacteria isolate result from giraffe's feses is got as much as four isolat, that is bacteria isolate 1: acidophilium facilis, bacteria isolate 2: acetobacter liquefaciens, bacteria isolate 3: cellulomonas sp, and bacteria isolate 4: acenetobacter sp.

This research is using random sampling methods compose with 5 treatments and every treatment is done in 6 repetitions. The treatment is are: I0: rice straw + 3% molassis + 3% urea + without isolat; I1: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 1; I2: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 2; I3: rice straw + 3% molassis + 3% urea + 5% bacteria suspension 3; I4: rice straw + 3% molassis + 3% urea 5% bacteria suspension 4

2. Testing cellulolytic fungi isolate of giraffe's faeces in rice straw

Celulolytic fungi isolate result from giraffe's feses consist of two cellulolytic fungi isolate. Based on the identification test result, the cellulolytic fungi from giraffe's feses is isolate 1: khamir geotrichum sp, while isolate two is aspergillus sporium sp.

This research uses random sampling methods, complete with 4 treatments and every treatment is done in 6 repetitions. The treatment are: J0: rice straw + 3% molassis + 3% urea + without isolat; J1: rice straw + 3% mollassis + 3% urea + 5% fungus suspension 1; J2: rice straw + 3% mollassis + 3% urea + 5% suspension fungi 2

RESULT AND DISCUSSION

1. Cellulolytic bacteria isolate of giraffe's feses in rice straw test

Crude based on analysis varians result knowable that dry ingredient contents of fermentation rice straw with cellulolytic bacteria isolate suspension show some result which is not differ real ($P>0,05$), while Crude fiber contents and Crude protein show different result ($P<0,05$), lit can seen in table 3.

Table 1.
Average and Contents Deviation Standard of dry matter (%), crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic bacteria suspension

Treatments	dry matter (%)	crude fiber (%)	Crude protein (%)
I0	89,87 ± 0,26	$35,33^{c}$ ± 0,28	$7,19^{a}$ ± 0,17
I1	89,99 ± 0,22	$33,77^{d}$ ± 0,36	$7,81^{b}$ ± 0,12
I2	90,08 ± 0,30	$25,58^{a}$ ± 0,48	$8,08^{c}$ ± 0,32
I3	89,90 ± 0,45	$30,27^{b}$ ± 0,71	$7,27^{a}$ ± 0,18
I4	90,06 ± 0,19	$32,86^{c}$ ± 0,39	$7,26^{a}$ ± 0,22

Explanation:
different superskrip in the same column show real difference ($p<0,05$)

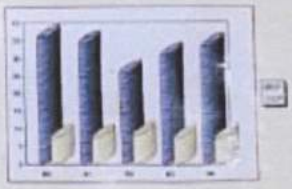

Figure 1.
Contents of crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic bacteria suspension

2. Cellulolytic fungi isolate of giraffe's faeces in rice straw test

Based on the varians analysis result knowable that the contents of dry ingredient, coarse fiber and coarse protein in the fermentation rice straw with cellulolytic fungi isolate suspension show result differ real ($P<0,05$), seen in table 4.

Table 2.
Average and Contents Deviation Standard of dry matter(%), crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic fungi isolate suspension

Treatments	dry matter (%)	Crude fiber (%)	Crude protein (%)
J0	$89,87^{a}$ ± 0,26	$35,33^{c}$ ± 0,28	$7,19^{a}$ ± 0,17
J1	$90,19^{ab}$ ± 0,20	$26,43^{a}$ ± 0,55	$8,28^{b}$ ± 0,19
J2	$90,04^{b}$ ± 0,20	$29,91^{b}$ ± 0,24	$7,52^{a}$ ± 0,32

Explanation:
different superskrip in the same column show real difference ($p<0,05$)

Figure 2.
Contents of crude fiber (%), and crude protein (%) rice straw which fermented with cellulolytic fungi isolate suspension

CONCLUSION

Based on the research result, inferential that:

1. Extending cellulolytic bacteria isolate suspension of giraffe's feses in rice straw can reduce crude fiber degree and increase crude protein degree of rice straw, and from four cellulolytic bacteria isolate which can be isolate successfully, acetobacter liquefaciens bacteria isolate give the best result
2. Extending cellulolytic fungi isolate suspension of giraffe's feses in rice straw can reduce crude fiber degree and increase crude protein degree of rice straw, and from two cellulolytic fungi isolate which can be isolate successfully, geotrichum sp. isolate give the best result