

THE EVALUATION AND THE PROSPECT OF FEED ADDITIVE IN INDONESIA

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SUMMARY

Feed additive is defined as an ingredient in small quantity with no significant nutrient values but has positive effects on metabolisms, feed efficiency, health and growth. The additives include antibiotics, acidifiers, enzymes, emulsifier, flavours, colours, probiotics & medical herbs. Little information for the last two subjects in Indonesia where plasm-nucleus system is a common practice in both for poultry and beef production. The livestock mainly are kept by small holder farmers as plasms who often buy commercial concentrate to the nucleus. Although it is not much in ruminant production systems, the application of feed additive seems to be a must in poultry production systems. In brief, addition of feed additives in a diet improves animal production and profits. Research on this subject is challenging particularly using potentially local ingredients. Studies on medical herbs has been attractive. For the last 10 years, related national institutes, R & D from the Health Department and the Agriculture Department have agreed to put more attention on the subject. It is summarised that utilization of feed additives in Indonesia is still limited and mainly in commercial poultry feed/foreign feedmills. However, awareness of the advantageous of the additives in livestock production is recognised and trials and research using local feed additives are on progress.

Keywords: Feed additives, ruminants, poultry, Indonesia.

INTRODUCTION

Feed is a largest cost required in farming industry. Almost 70 % of the total production cost in farm industry is for feed. Thus the feed offered to the animals not only provide essential nutrients but also contribute to disease avoidance and to health maintenance. Feed must be safe and free from pathogen, sustain an efficient immune system, and protect the animal against the ravages of oxidation and mitigate the development of non-infectious diseases. Nowadays, feed must consist of an enormous collection of different molecules, which classified into two major groups, namely nutrients and nutrices (feed additive). Nutrients are recognised as carbohydrates, fats, proteins, minerals, and vitamins. While feed additives are component of feeds that exert a beneficial effect upon health and metabolism yet are not direct nutrients. There are 7 important feed additives, namely antioxidants, antimicrobial compound, non-digestible oligosaccharides, enzymes, emulsifiers, flavours and colours (Adams, 1999). Feed additives have an important role to establish and maintain animal's health due to their function in prevent oxidative damage, control the growth of micro-organism in feed, stimulate appetite, influence the immune system, assist digestion and absorption of nutrients, and modify the microflora in the gastrointestinal tract, thus increase feed

efficiency and animal's growth. According to Hutjens (1991), feed additive is offered in small amount in ration of animals but have important role to improve animal productivity. Feed additives are a group of feed ingredients that can cause a desired animal response in a non-nutrient role such as pH shift, growth, or metabolic modifier. Some problem in nutrition and health and appropriate feed additive required are listed in Table 1.

Table 1. Some problem and feed additive appropriate to solve the problem.

No	Problem in nutrition	Feed additive
1	Feed safety	Organic acids, phenols, peptides, antioxidants
2	Voluntary feed intake	Flavours, sweeteners, colours
3	Nutrient digestion and absorption	Enzymes, emulsifiers
4	Microflora in GI tract	Non-digestible oligosaccharides, organic acids
5	Immune system	Antioxidants, peptides, plant extract
6	Non-infectious diseases	Antioxidants, phyto-oestrogens
7	Manure production	Enzymes, emulsifier

Source : Adams (2000).

In selecting feed additive, we need to consider the expected changes of performance will be achieved when the animal received the feed additive offered, type of problem faced in nutrition and how much profit will be earn.

Feed Additive for Ruminant animals

Many commercial feed additive from foreign countries are available in Indonesia, but the price is not cheap. They have been used by farmers in many developed countries. Some examples of feed additives are Biotin and protected choline to increase milk production and improve foot health (Seymor, 1998), Beta-carotene to improve reproductive performance, immune response and mastitis control; Ionophores (Monensin and lasalocid) will change rumen fermentation patterns (higher propionic acid and less methane) by reducing gram positive bacteria, improve growth, and feed efficiency and health in young animals (Hutjens, 1991); Enzymes (fibrolytic) to increase fiber digestibility by reducing fiber (cellulase and xylanase enzymes) and DM intake (Hutjens, 1991). Probiotics have also been used, such as *Lactobacillus acidophilus* to reduce and kill *Eschericia coli* in cattle's intestinal; Yeast culture to stabilize the rumen environment, significant increase in milk yield and milk composition (fat and protein levels), increases dry matter intake and less weight loss postpartum, simulate fiber-digesting bacteria, utilize lactic acid (Dann et al, 2000; Robinson and Garrett, 1999); *Aspergillus oryzae* to stimulate fiber-digesting bacteria, stabilize rumen pH, and reduce heat stress; Silage bacterial inoculants to stimulate silage fermentation, reduce dry matter loss, decrease ensiling temperature, increase feed digestibility, improve forage surface stability, and increase VFA (lactate) production.

However, it is likely that those commercials feed additive are not applicable for farms in Indonesia because of the high price and the small farm scale, where most of the farmers have small amount of cattle (smallholder farmers). Those feed additives also hardly find in the location of smallholder farms. Thus using those commercial feed additive will increase the production cost as well as reduce the incomes. Therefore, it is important to use local feed additive, which are cheap and easy to find in the location of

farm. Some promising local feed additives commonly used to improve animal productivity in Indonesia are described below.

a) Probiotic and Prebiotic

Many local probiotics have been produced in Indonesia. The main function of the probiotic is to improve digestion system of the animals, thus improve the feed efficiency. Some probiotics commonly used in dairy and beef cattle are Starbio, Probion, Bioplus (Bioplus Fiber, Bioplus Detoxification; Bioplus for calves), *Saccharomyces cerevisiae*, *Candida utilis*, *Aspergillus niger*, etc. These probiotics have been used by farmers in some region in Indonesia, such as West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, West Java, East Java etc. Most of them reported that by adding probiotics to their animals improved animal's productivity and farmer's income. Some examples results identified are described below.

In dairy cattle, the use of Bioplus, which was combined with *S. cerevisiae* and *C. utilis* was reported to improve feed conversion ratio from 1.4 kg DM/L of milk to 1.0 kg DM/L of milk, increased milk production from 8.5 L/day to 9.3 L/day and increased fat milk content from 4,02 to 4,19 (Winugroho et al., 2002; Heniwati 2003).

When these probiotics were given to beef cattle, the improvement in live weight gain, reduced the calving intervals period, reduced calves mortality recorded by some researchers (Santoso, et al, 1995; Haryanto, et al., 1999; Winugroho, et al, 2002).

Prebiotic usually used in animals fed low fiber diet and high concentrate diet. It help to maximize production endogenous enzyme in animal's digestive tract. The microbe commonly used as prebiotic is *Lactobacillus*.

Yeast has been known and used in human life long time ago. Recently, yeast is used as feed additive for ruminant in overseas countries. There are a lot of strains and varieties of yeast used for ruminant. Yeast for ruminant is sold as live-cell yeast or mixture of yeast with its medium growth. Yeast can manipulate rumen by increasing cellulolytic bacteria so that the digestibility increased and consequently improving daily gain (Wina, 2002). Some examples of yeast are *Saccharomyces cerevisiae*, *Candida utilis*, *Aspergillus niger* and *Aspergillus Oryzae*. Yeast *Saccharomyces cerevisiae* and *Candida utilis* reported improved beef cattle productivity and increased milk production both quality and quantity, particularly when it were combine with probiotic Bioplus (Winugroho, et al., 2002). *Aspergillus niger* and *Aspergillus Oryzae* has been reported improved sheep daily gain by 48 % (Darwinsyah, 2004).

Bioport is feed additive used to reduce loss weight during transportation of the animals. It consists of probiotic, minerals and vitamin. Its function is to reduce stress and prevent or recovery the loss weight of the animals during transportation. Loss weight of the animals was reduced from 13 % to 7 % when Bioport was given to the animals transported from NTT to Jakarta.

b) Herbals

1) Bumata (Bunga matahari)

Bumata is a powder made from receptulum of sun flower. Its contain antioxidant and antiinflammation agent, which can reduce mastitis in dairy cattle. Its combination with Bioplus and *S. cerevisiae* not only reduced mastitis case but also increased milk production from 12 L/day to 15 L/day and the quality of the milk (Elyza, 2003).

2) *Essential oil*

There are many type of essential oil extracted from many kind of traditional plant in Indonesia. These essential oils usually used to improve animal's productivity by increasing their appetite, increase production of endogenous enzyme in the digestive system, stimulate antiseptic and as source of antioxidant. Some examples of essential oils produced from traditional herbals of Indonesia are : sambiloto (*Andrographis paniculata*); tapak dara (*Catharanthus roseus* (L) G. Don); adas (*Foeniculum vulgare* Mill); daun dewa (*Gynura segetum* (Lour) Merr.) (Setiawan, 2004).

3) *Kenikir Leaves*

Kenikir is one of many herbals found in Indonesia. Tradicionaly it has been used as medicine for small ruminant. The leaves of kenikir (*Tagetes erecta* L) fed to the sheep (0.3 g/kg body weight) for 5 days was reported reduced the growth of Nematoda in digestive tract of sheep by 1,5% dan 25,87% (Erna Dwi Astuti, 2003)

4) *Other herbals*

Some plants species commonly used in animal health care for ruminant are ginger (*Zingiberaceae*); kunci (*Boesenbergia pandurata*), kunyit tumeric (*Curcuma domestica*), temu giring (*Curcuma heyneana*) temu lawak (*Curcuma xanthorrhiza*), lempuyang (*Zingiber zerumbet*). Herbals commonly used by farmers to improve milk production are dadap ayam (*Erythrina orientalis*), cumin, jinten (*Cumimum cymimum*), lawatan, katuk (*sauopus androgynus*), sembukun (*Paederia balsamifera*), saga (*Abrus precatorius*), waru (*Hibiscus tiliaceus*). (Tri Budhi, 1991).

Feed Additives for poultry

Feeds additives are commonly added in poultry feed as a growth promotant or improve feed efficiency. The most common feed additive used is antibiotics at sub-therapeutic doses, although there is a controversy on its impact on human health. Antibiotics used kill detrimental bacteria in the animal's gut. These days, an alternative healthy and cheap approach is to add live non pathogenic bacteria/ micro-organism to the animals feed or orally to the animals and to use Indonesian traditional medicines. These two additive feeds must be easy to improve the health and feed conversion ratio of farm animals. Some additive feeds used either as growth promoter or as medicine for poultry are identified by some researchers.

a) *Aloe Vera gel*

Extract from Aloe Vera was indicated contain antibacterial, which can killed bacterial pathogen in the tractus digestive of chicken. Additional of Aloe Vera gel and its extract in broiler ration reported improved feed conversion ratio by 3.5 %, increased gizzard weight, gastro intestinal weight and length, reduced the total count of aerobic bacteria in the digesta of tractus digestive (Sinurat et al., 2003).

b) *Garlic meal (Allium sativum L) and Kencur meal (Kaemferia galanga L)*

The two substances reported can improve performance of broiler. When they were added to the broiler ration with the level of 0.5 % for kencur meal, which was combined with 0.02 % of garlic meal, live weight increased from 1603 g to 1697 g; but reduced the feed consumption from 3473 g to 3380 g; thus improved feed conversion ratio from 2.18 to 1.99 (Ida Ayu Ketut Bintang, et al., 2003). Extract of garlic was reported contain an anti-mycotic, anti-mutagenic, and anti-carcinogenic, which can prevent the binding of aflatoxin with DNA (Tadi et al., 1991). Moreover Kim et al (2000) reported that Garlic also contains *flavonoid* as antioxidant. It also contains *allicin* and *ajoene* (Adetumbi and Lau, 1983; Arunachalan, 1980). The addition of garlic meal 0.4 mg/kg ration in layer decreased the level of aflatoxin up to 42.2 %, while higher doses of garlic meal (5 mg/kg ration) reduced the level of aflatoxin up to 49 %. This finding is very important, because aflatoxicosis, a disease generated as the consequence of aflatoxin contamination in foods and feeds), is one of the constraints to the development of poultry industry in Indonesia.

c) *Kunyit (Curcumin) and Lempuyang*

Kunyit (Curcumin) is reported has a function as antibacterial and antibiotics. It can be used as medicine or to prevent the animals from the disease. It has an effect on the yellow colour of meat and yolk egg (Somaatmadja, 1981). Lempuyang contains flavonoid, which can act as anti bacterial, anti virus and anti oxidant (Ramprasad and Sirsi, 1975).

d) *Red Ginger (Zingiber officinale var Rubra).*

Additional of 0.5 % of red ginger powder in layer's ration has been reported to reduce the damage of sekum and the animals did not have coccidiosis. Iskandar et al. (2000) also reported that additional of 1 % extract red ginger reduced coccidiosis cases in broiler. It is reported that red ginger contains *jejerenom*, which can make a lysis and destroy *Emiria sp.* wall on digestive tract of the animals (Rahayu et al., 1996). Red ginger, therefore, can be use as an alternative medicine for coccidiosis disease (act as coccidiostat). This medicine is important in Indonesia, since coccidiosis is one of the important poultry diseases in Indonesia. The disease has a negative effect on poultry industry because of high mortality and morbidity, reduce feed efficiency and live weight, slow growth, thus, reduce production (Tampubolon, 1996).

e) *Probiotic Kombucha*

Probiotic kombucha is fermented tea of kombucha which is one of natural feeds additive. It can be use as source of probiotic to prevent bacterial pathogen in digestive tract of broiler chicken. It consist of kumbucha like organic acids, enzymes, vitamins and live microorganism such as *Acetobacter xylinium*, *Bacterium glucocum*, *Acetobacter kategonum*, *Picha fermentans* and *Sacharomyces*. When it was fed to the brioler chicken the carcass weight increased by 2 %. However it has no effect on edible offal and body fat content. When tea kombucha was mixed in drink water of brioler chicken by 25 %, the fat of abdominal was decreased while the HDL content was increased (Akhadiarto, 2002). In relation to avian influenza, Indonesian herbalists use local recognised herbs (Elfahmi, 2006) to fight the virus.

What need to be concerned in feed additive is that every producer or country have to produce high quality feed as recommended by the SPS (*Sanitary Phyto Sanitary*) to produce good quality feed as preference by the consumer. The feeds produced have to follow the SNI standard and or International standard (*Codex Alimentarius Commission*). Feed additives should be produced based on UU No. 6 year 1967 about animal husbandry and veterinarian and also on Keputusan Menteri Pertanian number : 242/kpts/OT.210/4/2003 about registration and labelling of feed produced.

CONCLUSION

It is concluded that Indonesia has many sources of materials, which are potential to be used as feed additives. Moreover, they have more advantages because farmers are already aware and the materials can easily found around farmer's place and practically cheaper hence may improve household income. Scientifically, the use of local feed additives attracts research workers to further study their advantageous an animal production systems.

RECOMMENDATION

More coordinated research should be conducted and regular meeting between young scientists across countries definitely could speed up the understanding of the knowledge. How immunity could be enhanced by feed additives is one of interesting subjects to study.

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