

A Study on EM Technique for Comprehensive Utilization of Alcohol Distillery Residues

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Abstract : Nanyang Alcohol Factory is by far the biggest used for food alcohol production by using the dried sweet potatoes in China, which produce 80,000 tons of alcohol each year. It produces more than 1 million tons of liquids of the alcohol distillery residue, which not only causes water pollution, but also wastes about 12% solid organic. Alcohol distillery residues, the broken straws and the mill offals in proportion of 10:3:1, were inoculated with EM1 liquid of dilution. After adequate stirring, injected it into the fermentative pool to anaerobically ferment. The optimum technological conditions were determined through the orthogonal experiment. The fermented product (EM alcohol distillery residues fermentative feed) is an active feed containing effective microorganisms, yellowish - brown in color and sweet-sour taste and mostly eliminate the original smell of the alcohol distillery residue. It contains 25.60% crude protein, which is 4.4 times the initial level. The amino acid is 22.80%, which is 4.6 times the initial and the crude fiber is dissolved too. The preliminary results of pig feeding showed good palatability, rapid growth, strong disease resistance and greatly reduced fecal stink. The technique has offered a new way to fully utilize the alcohol distillery residue for saving grains and to protect the environment.

twenty four, 9-10 weeks old New Zealand White rabbits (mean body weight of 2150g) of both sexes were allotted to four treatments to study the effect of EM on nutrient digestibility at two different dietary qualities. A low quality ration (LQR) containing 50% rice bran and 25% poultry by product meal or a commercial feed (broiler finisher - BF) were fed alone or in combination with EM for 7 weeks. Dried grass (*Brachiaria brizantha*) and water were provided *ad libitum*. Feed intake was measured weekly and nutrient digestibilities were estimated during 3 collection periods. In the second experiment, twelve 8-9 weeks old, male and female rabbits of the same breed were fed a basal feed formulated to contain all nutrients required by rabbits (NRC, 1977) with or without EM during 10 weeks. Feed intake and weight gain were measured weekly. Nutrient digestibility at ileum, caecum, large intestine and in faeces, and carcass characteristics were evaluated to study the effect of EM. In the first experiment, EM improved the intake and crude protein digestibility of LQR by 3.4, and 3.3%, respectively, while the crude protein digestibility of the commercial feed was increased by 1.9. In BF, fibre digestibility was not affected by EM.

In the second trial, EM improved the feed intake, weight gain and feed efficiency by 4.0, 32.6 and 21.6%, respectively. Carcass recovery was improved by 16.7%. Sex of the rabbits did not have any significant influence on any of the parameters tested. EM resulted heavier pancreas and caecum compared to the control.

Crude protein digestibility at ileum, caecum, large intestine and in faeces with EM were 0.702, 0.678, 0.712 and 0.723, respectively, as compared to 0.668, 0.649, 0.675 and 0.698, respectively, in the control. Corresponding crude fibre digestibilities with EM were 0.172, 0.175, 0.175 and 0.179 which were higher than that of control (0.164, 0.166, 0.167 and 0.169, respectively). As a live beneficial microbial culture, EM must have improved the microbial activity and thus the nutrient digestibility and performance of the animal. EM reduced the feed cost per kg live weight and per dressed weight by 15.5 and 27.6%, respectively. Present findings indicate that rabbits could be reared more economically on locally available low cost feed stuffs, if the feed is supplemented with EM.

Effect of EM on Shrimp Culture in Different Salinity Levels of Water

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Abstract : *The influence of EM (extended EM, Bokashi and EM5) applied for pond preparation and also during tiger prawn culturing until harvest were compared in two shrimp farms located in two different provinces in Thailand, one having water salinity of 0-2ppt and the other 20 - 22 ppt. The water was tested for BOD, COD, NH₃, P, pH, coliform and salinity one day before starting and 60 and 90 days after starting. The first*

weight of shrimp was measured after harvest and feed plus EM consumption were calculated to determine cost, yield, income and profit. Results showed that shrimp were healthy with less odour and disease free. The cost of production was low because EM price was cheaper and feed consumption ratio was lower. Treated ponds had three harvests of shrimp per year without exchanging water whereas conventional farms could have only one or two harvests per year with water exchange. The production of EM shrimp farming is really organic shrimps.

Effects of EM on Growth Rate and Feed Efficiency in Ducks

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Abstract : *EM (Effective Microorganisms) have been widely used in Thailand to protect the environment and increase the efficiency of farm practice. In animal farms, it has been reported that EM can effectively reduce farm odour. However, at present the effect of EM on production efficiency is not clear. The current experiment was, therefore, conducted to investigate the effect of EM on growth rate (ADG) and feed conversion ratio (FCR) in ducks. F1 (Kaki Campbell X Native) male ducks were divided into 3 groups, and each group was randomly assigned to either of the 3 treatments: without EM (control), EM in feed and EM in drinking water. The result showed that feed conversion ratio (FCR) was significantly higher ($P < 0.01$) in EM treated animals than the controls, the figures being 3.42, 3.01 and 3.22 in the control, EM-in-feed and EM-in-water groups, respectively. However, growth rate (ADG) was not significantly different between groups, i.e. 32.00, 32.21 and 31.50 g/d, respectively. This indicates that giving EM to ducks by adding to feed or drinking water improves their feed utilization. Furthermore, it was also observed that using EM resulted in the decrease in the odour in both the carcass and the farm.*

In situ and Laboratory Scale Dairy Plant Waste Water Treatment by Using Effective Microorganisms

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Abstract : *The dairy unit of Kasetsart University, established 36 years ago was the first modern unit of its kind in the Kingdom of Thailand. The plant produces 17 tons/day of pasteurized and a number of fermented milk and generates an average of 65 m³ of wastewater with very high BOD, COD and total volatile solids accounting for 3319, 4767 and 1234 mg per litre, respectively. Semi-continuous mass culture of EM was*

carried out and extended EM was utilized for in situ treatment of the plant wastewater. In the treatment process, mixture of extended EM and water at a ratio of 1 : 20 was sprinkled on the surface of the first reception pond twice daily. Within a few weeks, there was a significant reduction of smell and environmental problems of crust formation on the surface. Analysis of wastewater revealed the BOD removal of 80% at the first pond and 94% at the second pond, COD removal of 79% and 93% and total volatile solids removal of 78% and 95%. After 3 years of continuous operation, effects of the treatment using EM were re-evaluated both in situ ponding condition and in laboratory scale experiment. For in situ treatment of the plant wastewater, study which involved 2-month period yielded the average BOD reduction of 62% at the first pond and 94% at the second pond. The respective COD reductions were 74% and 95%. Two bench scale reactors simulated the plant wastewater treatment ponds were used in laboratory experiment. Results obtained for one-month comparative study of the performance characteristics of the reactor which was applied with EM twice daily to those of the other reactor which was served as control verified the beneficial effects of EM, reductions of BOD and COD were 40-58% at the first pond and 60-75% at the second pond.

Shrimp Culture with Effective Microorganisms in China

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Abstract : Application for a long-term period 2 ppm EM liquid into the pond can help purify the water effectively. The survival rate of shrimps reaches 61.69 percent, the output is 199 kilograms per mu and the profit is 2303.55 yuan. The output is 31.5 kilograms more than that of the check group and the profit is 871.73 yuan higher. Provided that water quality is improved by EM technology, 2 ppm liquid is added to feeders for fermentation and then are poured into pond. The outcome shows the survival rate reaches 73.13 percent, output is 228.5 kilograms per mu and profit is 3132.91 yuan, 61 kilograms more and 1701.09 yuan higher than those of the check group.

Sustainable Livestock and Crop Management with the Technology of Effective Microorganisms

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Abstract : The technology of Effective Microorganisms (EM) is a holistic concept that could be easily adopted on farms. The advantages arise from the benefits in terms of animal growth, the processing of wastes and its use in crop production. Thus studies were undertaken in Japan to evaluate the holistic concept of EM. In dairy cattle, milk

yields were increased along with quality. Mastitis incidence was reduced. The foul odors of cattle sheds were lower and the time taken for composting of manure was also reduced. Thus the manure was ideal organic fertilizer for cropping and was effective in supporting growth of many crops. The application of the slurry reduced weed incidence. The overall integration of EM into farm operations is presented based on these case studies in Japan.
