

Chapter I
INTRODUCTION

Since the increase in overall population of the world is really rapid, the need of protein from meat has become a problem every nation is now facing. In the past, Thailand had a large supply of fish from her sea which was once a main source of protein supply but technical development of fishery equipments and unstrictly law cause no more fish supplied in the future. Therefore, feeding animal is important. Pork and chicken meat are the most popular in Thailand. Pig raising takes about 6-7 months while broilers needs only about 60 days, so broiler feeding is more interested (Anonymous, 1974). A broiler will take about 60 days to gain weight from 1.5 to 2 kilos. This leads to the study of feeding meal to reduce both the raising time and the cost of raising to minimum. Raw materials used in making feed meal become a matter of interest. Investigation on what and how much nutrients animals need to promote growth, such as protein, carbohydrate, lipid, calcium, phosphorus, vitamins and antibiotics has been studied extensively.

Carbohydrate, lipid are easily obtained from any ingredients. Calcium and phosphorus are given by calcium phosphate or oyster shell. Vitamins and antibiotics are synthesized to add in feed meal. The protein requirement is rather complicated as both quality and quantity aspects must be satisfied. Fish meal and soybean meal are the most important sources of protein because of their high protein and available essential amino acids as shown in Table 1. However, both protein foods are expensive and insufficient to meet the demand.

Presently, they are about 33 ready-mixed animal feed mills operating

Table 1

Amino acid content of fish meal and soy bean meal. The values are expressed in grams per 16 grams of nitrogen.

Amino acid	Fish meal	Soy bean meal
Isoleucine	4.6	5.4
Leucine	7.3	7.7
Phenylalanine	4.0	5.1
Tyrosine	2.9	2.7
Threonine	4.2	4.0
Tryptophan	1.2	1.5
Valine	5.2	5.0
Arginine	5.0	7.7
Histidine	2.3	2.4
Lysine	7.0	6.5
Cystine	1.0	1.4
Methionine	2.6	1.4
Total S-acids	3.6	2.8

Reference - Shacklady, C.A. and Gatamel, E. 1972. The National Value of Yeast Grown on Alkanes, Symposium D'Aix - en - provence, London.

throughout the country, of which five are large mills and 28 small mills. Feed meal production in 1972 from the five large mills was shown in Table 2. Growth in production of animal feed has increased by an average of 35 % per year for the last four years. The demand of some ingredients used in animal feed was shown in Table 3. It can be seen that a huge volume of fish meal and soy bean meal are needed for feed meal. There have been many problems connected with the supply of fish meal and soy bean meal, partly because the ingredients themselves were being exported in large quantities. Production of fish meal in 1972, was about 120,000 tonnes and about half of it is exported. For soy bean meal, in 1975, it is expected that it will be more expensive and insufficient for demand of animal feed plants (Anonymous, 1975). Therefore, finding out of other sources of protein is essential.

Researches on single-cell-protein (SCP) (Abrahamsson, 1971; Protein Advisory Group, 1971; Mateles, 1968) have found that various species of bacteria and yeast contain high quantity of protein which can be used in feed meal. Recent developments in fermentation techniques have permitted an increasing number of species of yeast and bacteria to be employed for amino acid fermentation, production of antibiotics, vitamins and enzymes, alcohol fermentation, etc. The amounts of microbial cells produced in these industries increases year after year. These by-product microbial cells have been registered as possible source of protein food. (Finn, 1970).

Utilization of yeast from brewery plant is rather limited (Amatavivat, 1975). Brewery yeast which is a fermentation by-product is wasted to a large extent and results in extensive water pollution. In the present time, about 3-5 hectoliters of fluids from brewery yeast as fermentation by-product are produced in Thai Amarat Brewery Ltd. (Amatavivat, personal communication). The waste contain-

Table 2

Five large ready - mixed feed mills and their actual production in 1972.

	Production (ton)	Percentage of Total Production
Charoen Pokphan Industry Co., Ltd.	73,500	27.6
Sri Thai LiveStock Co., Ltd.	45,000	16.9
Later - Industrial Trade Co., Ltd.	38,350	14.4
Betagro Co., Ltd.	36,000	13.5
Ralston Purina (Thailand) Co., Ltd.	13,600	5.1
Total production of 5 plants	206,450	77.6
Others	60,000	22.4
Grand total	266,450	100.0

Reference - Anonymous. 1974. Report on Animal Feeds, The Investor,
vol. 6 no.9 p.32.

Table 3

Demand of some ingredients used in feed meal. Values are expressed in tonne per year.

Ingredients	Demand of 5 Major Feed Plants ¹	Demand Country-wide ²
Fish meal	45,790	60,000
soy bean meal	38,200	40,000
Other bean waste	21,100	23,000
Rice bran	-	1,000,000
Rice bran waste	36,400	36,000
Broken rice	24,640	2,000,000
Coconut waste	7,300	9,000
Maize	43,600	180,000
Sorghum	3,000	10,000

¹ Commodities Research Unit, Commercial Economic Department

² Estimate from the requirement of 5 major feed plants and all small plants, and also surveys on feed use at raisers' level.

Reference - Anonymous, 1974. Report on Animal Feeds, The Investor, vol. 6

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ing sugar and soluble protein is nutrient for microorganisms. Treatment of this waste into a utilizable yeast as a source of protein to be used in feed meal would be a very promising technique. This will decrease the shortage of protein-rich foods as well as production cost. The problem of waste disposal is also minimized.

The objective of this study was to utilize brewery yeast as an ingredient in animal feeds. Broiler was selected in this study under the cooperation of Charoen Pokphan Feedmill Co. Ltd. of the protein sources available to broiler, fish meal and solvent extracted soy bean meal are both quantitatively and qualitatively the most significant. It would be reasonable, therefore to compare the value of brewery yeast protein with these conventional protein sources in poultry feeding. A quantity of fish meal and soy bean meal was replaced with brewery yeast in separate studies. No published data are found along this line.

The growth characteristic of broilers fed with feed meal containing brewery yeast was compared with commercial feed meal. Emphasis was placed on noticed broilers activity, the number of alive animals, feed consumption, and broilers body weight. The main criterion for judging the efficiency of these feed meals was kilogrammes of feed it take for the broiler to gain one kilogramme of body weight. The protein efficiency was also determined among various feed meals.