

# THESIS

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PAGE

FOR REFERENCE

NOT TO BE TAKEN FROM THIS ROOM

## COST ACCOUNTING FOR BROILER FARMS

by

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## PREFACE

In recent years there have been great technical improvements in the poultry industry in Turkey. The value of poultry products has been understood by some entrepreneurs as well as by agricultural institutions of the government.

It is unfortunate that this technical development in the sectors have not been supported by the development of the essential tools of management. The methods of internal control are poor and provide the managers with little information. The purpose of this paper is to present a possible method of cost accounting mainly for internal control to future large-scale broiler farms.

At first, I was planning to write on the general topic of 'Cost Accounting for Poultry Farms'. During my preliminary field research I saw that much more emphasis was put on egg and chick production than on broiler production. For example, Ziraat Bankası grants loans to poultrymen who plan to begin egg production. On the other hand, there are very few researches, anquettes, and regulations about broiler farms compared to those about the other branches of the poultry industry. Therefore, trying to provide a balance to this unequal treatment of the branches of the industry, I decided to concentrate my studies only on the subject of broiler production.

This paper places a particular stress upon the internal development and use of cost data for analysis and control within the farms. It presents an understandable picture of recording and analyzing the activities of any broiler farm. In this respect it mainly addresses itself to those broiler farmers who want to satisfy their needs for a cost accounting manual which could indicate the appropriate accounts, transactions, and costing methods for the major and subsidiary products of their farms.

The general outlook and the importance of poultry products in comparison with other meat sources are presented in the introductory section. Next, Poultry Industry in Turkey, provides facts and evaluations of these facts about the Turkish poultry industry as a whole. Broiler production as a separate branch of the poultry industry, is presented under General Features of Broiler Production. Here, methods of production, processes, and flow of products are discussed. Accounting



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for Continuous Type of Broiler Production presents a clear and detailed picture of the chart of accounts. Process Costing for Broiler Farms, the central theme, concentrates on the costing of inventories and broilers sold. The system of process costing and the related entries for the activities are presented in this part. Next, the nature and accounting treatment of the by-products of the broiler industry are discussed. Finally, concluding remarks about the whole system are made.

I am grateful to many persons for their assistance during the preparation of this thesis. First of all, I must remember my late grandfather, Ali Otar, from whom I unquestionably inherited the love for chickens. Particular gratitude is due my fiancée, Miss Nilgün Gürerin, for her valuable help during my preliminary work on the paper.

I am indebted to Messrs. Vasfi Hakman, Mahmut Yücel, Avni Başdoğan, Cemalettin Akpınar, Orhan Alpan, Fethi Açıl, and Vedat Banoğlu for their valuable and sincere help during my preliminary field studies in Ankara.

Finally, my appreciation and thanks are extended to my father, Ismail Otar, and my professor, Dr. İbrahim Ö. Ertuna for their invaluable help in reviewing the methods, computations, and ideas contained in this paper.

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## INTRODUCTION

Animal protein is a vital part of human nutrition. Limited supplies of it forced the advanced nations to find efficient methods of producing animal meat. As a result, fish, swine, cattle, and poultry production showed tremendous improvements.

One of the most important criteria of efficiency in meat production is the rate of growth of animals per period of time given the amount of feed. Table 1 shows a comparative growth rate for four types of protein resources. It is obvious that sheatfish has the greatest ability

TABLE - 1. Additional Live Weight Gained from 1 kg. of Feed.<sup>1</sup>

<u>Animal</u> :	<u>Live weight (gm.)</u> :	<u>Protein (gm.)</u> :
Sheatfish	715	118
Poultry	356	101
Cattle	163	26
Sheep	185	22

to convert feed into meat. Today, Turkey is not in a position to make huge investments in fish production. Artificial environment for fish is costly to create. Secondly, competition from the present fish industry would be overpowering. Finally, there is no feed industry available for artificial fish production.

Cattle and sheep meats are popular in Turkey. The main limitation on the conversion rate is that the animals are not reproductive compared to fish and poultry even though artificial insemination methods are currently applied. Besides, turnover is considerably lower.

<sup>1</sup> Lâtif Berkmen and Z. Tolgay, "Toplum Beslenmesinde Hayvansal Besinlerle Gıda Kontrolü ve Teknolojisinin Önemi", Türkiye 1. Hayvancılık Kongresi, 5. Oturum, 4. Tebliğ, Ankara, 1968.

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We can say that reproduction of poultry is almost infinite if farm capacity is ignored. Furthermore, chickens easily convert feed into meat. The efficiency of this conversion is impressive. For each 1 1/2 kilograms of feed consumed, 1/2 kilograms of eggs can be laid. Similarly, two-month broilers which weigh approximately 1 1/2 kilograms eat only four kilograms of feed. In Istanbul, one kilogram of poultry meat sells at 10-16 TL., whereas, one kilogram of feed costs 1.05-1.30 TL.. Feed costs are 60-75% of the whole production costs of a broiler farm.

Today the demand is much higher than the supply of poultry products. There is a tendency towards poultry raising among the people. Parallel to this development, the government is making plans to expand the feed industry in order to satisfy the increasing demand of poultrymen. In the near future, there will be many firms engaged in the poultry business. Together with the development of technical knowledge, skilful persons at administrative levels will also be needed. Small poultry farms will probably turn out to be large egg and broiler firms. They will be in need of modern techniques of management for a sound administration of their farms. Cost accounting is one of the most important tools by which the firm can measure its efficiency, cost its products, and control its various activities at the management level. Therefore, it is my belief that with a paper on this subject, the prospective Turkish broiler farmers will be able to deal with some of their problems more easily.

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## POULTRY INDUSTRY IN TURKEY

### A Short History

The law covering the establishment of the State Breeding Farms states that "In order to increase the agricultural efficiency, to introduce more variety of products, . . . the State Breeding Farms have been established."<sup>1</sup> This statement marks the beginning of the modern poultry industry in Turkey. The department of State Breeding Farms owned 18 farms in 1950, and each farm had its own poultry branch. But, in those days, Poultry raising in the state farms was no better than an average private endeavour in terms of productivity.

In 1951, Mr. O. C. Ufford, a poultry expert from Colorado, was invited to Turkey, and work to improve poultry farming began.<sup>2</sup> During his seven-year residence in Turkey, Mr. Ufford worked mainly on the improvement of the domestic Turkish poultry. His idea was that the domestic races of the country could be improved by crossbreeding them with the American breeds.<sup>3</sup>

The second attempt by the Ministry of Agriculture was to send some Turkish poultrymen to the United States for practical training at several farms. After their return, methods of poultry raising showed considerable developments, and a positive attitude toward the poultry industry was created among Turkish people. This attitude was furthered through propaganda visits to private farms, seminars, and exhibitions.

In 1954, with the aid of the World Council of Churches, the first lot of Leghorn- and New Hampshire-breed chicks were imported from

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<sup>1</sup> Law No.: 5433, Resmî Gazete, No.: 7231, June 13, 1949 (Ankara : Başbakanlık Neşriyat ve Müdevvenat Müdürlüğü).

<sup>2</sup> Ministry of Agriculture, Birinci Türkiye Millî Tavukçuluk Kongresi Raporları (Ankara : Ayyıldız Matbaası, 1959), p.11 .

<sup>3</sup> Interview with Mr. Vasfi Hakman, owner and general manager of the magazine, Çiftlik, January 20, 1969.

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the United States. The number of chicks was 65,000 with a small number of turkey chicks. The successive generations of these breeds were distributed to public and private farms. In the same year, the government imported a number of high-capacity incubators for mass production considerations.

Because of the increasing demand for technical men, the Ministry of Agriculture, in 1956, sent four professional men to the United States for a three-month training. On their return, these men wrote several practical books and pamphlets for Turkish poultrymen. From that time on, the publications on the technical aspects of poultry raising increased very much during the years 1956-60.<sup>1</sup>

The first commercial poultry farms were established around Istanbul. Then, the number soon increased, and as a result of their demand for baby chicks the government decided to raise the capacity of chick production. Besides, private institutions were established only for the production of 'day-old' chicks. Meanwhile, several workshops began to manufacture various kinds of farm equipment such as small-capacity incubators, feeders, brooders, waterers, etc. for poultry farmers.

Together with this development in the industry, some problems arose. The most important one was the lack of high-quality breeders. The breeders that were imported 1954 and 1956 soon began to be degenerated because of geographical, technical and genetical factors. In fact, the imported chicks were of medium quality due to the fact that the United States farmers were unwilling to send their best breeds under just an aid program.<sup>2</sup> So, as time went on, the productivity of farms declined. Secondly, the feed industry was far from being sufficient for the needs of the farms. Especially, animal protein resources, such as fishmeal and meatmeal for the feed industry were severely insufficient. Another difficulty was (and still is) the lack of knowledge about the handling of poultry diseases. The imported American breeds did not have as high immunity as the domestic Turkish breeds did. For this reason, some losses were incurred by several farms.

According to the 1965 statistics, there were 259 private farms in Turkey. 130 of those farms were engaged in egg production, 104 in

<sup>1</sup> Ibid.

<sup>2</sup> Ibid.

egg and broiler production mixed, and 25 in broiler production only. The total egg and chick production of the first two types of farms are 16,050,866, and 800358 units respectively.<sup>1</sup>

### An Economic Outlook.

Turkey may well have an established market for a poultry industry. Climatic and geographical factors are suitable for poultry enterprises, and there are many possibilities of obtaining raw materials for the feed industry. Furthermore, the country is very close to the European and Middle-Asian markets. Nevertheless, today, Poultry products comprise only 0.85% of the national income of the country.

### Production.

According to the 1965 statistics, the poultry population is 32,237,000, and egg production is 1,421 millions. Modern farms have only 5% of this population. The remaining 95% is found in the villages and most of the birds are of domestic breeds.

Poultry population has usually been below the human population of Turkey. Only in 1939, 1940, 1941, and 1958 the number of birds exceeded the number of people.<sup>2</sup> Generally, between 1938 and 1968, the number of eggs and kilograms of poultry meat per capita remained almost constant. Rate of increase of the poultry population has been 2.5%, whereas the human population rate was usually 3%.

The methods of production are very primitive in the villages. The productivity is low even of modern farms. As an average, the number of eggs laid per hen per year is 50-60 for domestic breeds, and 160-190 for foreign breeds. This average is 235 and 211 for Denmark and the United States respectively. In these countries the feed consumption per bird was decreased by 35.9% of what it was in 1920.<sup>3</sup>

<sup>1</sup> Özel Tavuk Yetiştiricileri Arasında Anket, prepared by Ziraat İşleri Genel Müdürlüğü Küçük Evcil Hayvanlar Şubesi Müdürlüğü, 1965.

<sup>2</sup> Fethi Açıl, Türkiye Tavukçuluğunun İktisadî Cephesi (Ankara: Ankara Üniversitesi Basımevi, 1966), p. 16.

<sup>3</sup> Mahmut Akkılıç, Leghorn Cıvıv ve Tavuk Rasyonlarında Balık Unu Miktarının Düşürülmesi Üzerinde Mukayeseli Araştırmalar (Ankara: Ankara Üniversitesi Basımevi, 1967), p. 2.

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## Consumption.

Consumption of egg and poultry meat in 1968 is almost the same as that of 1938. Freshly-laid eggs are hard to find. According to Turkish standards, fifteen-day-old eggs are considered to be very fresh.<sup>1</sup> Egg sales of modern farms are endangered during spring and summer because of the competition from the eggs produced in the villages. Poultry do not cost anything to the peasants. Therefore they sell eggs at a price as low as 18-20 kuruş per egg. Some of those eggs are bought by middlemen, and then, are offered for sale at lower prices than those charged by modern farms. It is unfortunate that middlemen usually keep the spring and summer eggs even for six months and sell at high prices during the winter.<sup>2</sup> Since the demand is high and supply is quite low in winter, consumers, without being aware of the quality of eggs, pay 60 kuruş per egg and buy these eggs which are of very poor quality.<sup>3</sup>

## Exports.

At one time, Turkey was an exporter of poultry products. Egg exports followed a seasonal pattern reaching a peak in May and June, and dropping to a minimum in January and February.<sup>4</sup> During 1931-32, the amount of eggs exported was as high as 25 thousand tons. From then on, exports gradually decreased and the country was not an exporter anymore. In 1958, exports were only 39 tons of eggs. In the following years, it again rose above 1,000 tons, but today, it is very low and eggs are sold only for industrial uses, not for food.

This is really unfortunate for a country the exports of which are mainly agricultural products. In much of the literature on poultry production and exports, it is stressed that Turkey is very close to the European markets, implying that the country must improve its poultry products and must sell only to these markets. However, European markets

<sup>1</sup> Interview with Mr. Mahmut Yücel, Ziraat İşleri Genel Müdürlüğü Küçük Evcil Hayvanlar Şubesi, Technician, January 23, 1969.

<sup>2</sup> Dünya Gazetesi, January 29, 1969, p. 3.

<sup>3</sup> Ibid.

<sup>4</sup> Açıl, op. cit., p. 15.

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are dominated by Bulgaria, Belgium, and Poland, and by the giant producers, i. e. Denmark and Holland. In my opinion, Middle-Eastern countries may very well be the future customers of Turkey. Israel is the greatest poultry producer in the Middle East. By taking quick steps in the development of mass production Turkey can sell her poultry products to all of the Arabian countries, because it can make use of the advantage of the hostility between Israel and Arabian countries. So, at present, Israel cannot be a competitor of Turkey in this market.<sup>1</sup> Today, the percentage of Turkey's exports to the Middle East is 7.9% of the whole exports of Turkey, and most of the exports are live animals excluding the poultry.<sup>2</sup> Furthermore, the government does not give any tax benefits to the exporters of poultry products as it does to exporters of some other categories of goods.<sup>3</sup>

## Imports.

As mentioned above, 65,000 baby chicks were imported from the United States for breeding purposes. These imports gave a stimulus to the poultry industry, and it was really useful for the interests of the country. But another decision taken by the government had drastic results. In 1959, 3,100 tons of dressed poultry meat valued at about 2.25 million dollars were imported from the States. It is said that this importation resulted in a retrogression of the Turkish poultry industry for five years.<sup>4</sup> Today, pedigreed baby chicks are still imported, but mainly from Israel and Italy. The Ministry of Agriculture stimulates the high-quality pedigreed chicks, and some regulations were imposed on imports.<sup>5</sup> Farm capacity, characteristics of the breeders, and control of the imported chicks are the main criteria for a license of importation. In 1967, 73,183 pedigreed chicks were imported by private

<sup>1</sup> Türkiye Ticaret Odaları, Sanayi Odaları, ve Ticaret Borsaları Birliği, İk tıradı Rapor (Ankara: TR Tic. Od., San. Od., ve Tic. Bor. Birliği Basımevi, 1968), p. 73.

<sup>2</sup> Özgür Yeğenoğlu, Ortadoğu Ülkeleri ile Ticari İlişkilerimiz (Ankara: Devlet İstatistik Enstitüsü Basımevi, 1968), p. 46.

<sup>3</sup> Devlet Plânlama Teşkilâtı Müsteşarlığı, Yatırımların ve İhracatın Teşviki ve Uygulama Esasları (Ankara: Başbakanlık Basımevi, 1968), p. 109.

<sup>4</sup> Cemalettin Akpınar et. al., Yumurta ve Tavuk Eti Üretim ve Tüketim Hedefleri - 1967-2000 Yılları, (preliminary paper), Ankara, 1966, p. 46 (mimeographed).

<sup>5</sup> Tarım Bakanlığı Zir. İşleri Gnl. Md. Küçük Evcil Hay. Şb., Yabancı Memleketlerden Damızlık Yumurta, Cıvciv ve Tavuk İthal Edecek Özel Yetiştiriciler İçin Şartname, preliminary paper, Ankara, 1966, pp. 1-3 (mimeographed).

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enterprises.<sup>1</sup> Offsprings of those chicks are sold to customers at much higher prices than the price charged by the State Breeding Farms and by other state-sponsored farms.

## Prices.

Egg and meat prices have continuously increased in the past years. Today, prices are higher than those in Germany, Holland, and the United States.<sup>2</sup> For example, using the price of eggs in 1938 as the base, the 1963 price index comes out to be 2,037.<sup>3</sup>

Egg price indexes have always been much higher than the wholesale, standard of living, cereal, and animal feed price indexes. The fact that the increase in the feed prices are lower than the increase in egg prices shows that there is an advantage to egg producers.

The greatest portion of feed production is carried on by the state-owned Yem Sanayii A.Ş. which sells at prices comparatively lower than those set by private manufacturers. A portion of the high prices of poultry and eggs may be attributed to the high percentage of feed costs among the other costs of poultry and egg production.<sup>4</sup> The feed prices are also high in Yem Sanayii A.Ş. due to inefficient production methods. Additionally, fishmeal, which is an important ingredient of feed because of its high level of protein content, is very insufficient in supply. According to the 1963 records, the supply of fishmeal is 187 tons per day whereas the demand is 300 tons.<sup>5</sup> For this reason, the quality of

<sup>1</sup> Tarım Bakanlığı Zir. İşl. Gnl. Md. Küçük Evcil Hay. Şb., 1967 Yılında Civciv İthalı İçin Bakanlıkça Firmalara Verilen Müsaade Belgesi, preliminary paper, Ankara, 1968, (mimeographed).

<sup>2</sup> Survey conducted by Zir. İşl. Gnl. Md. Küçük Evcil Hay. Şb., Ankara, 1967, (mimeographed).

<sup>3</sup> Cemalettin Akpınar et. al., op. cit., p. 39.

<sup>4</sup> Hayvancılık Özel İhtisas Komisyonu Raporu, prepared by Başbakanlık Devlet Plânlama Teşkilâtı, Ankara, 1966, p. 21.

<sup>5</sup> Mahmut Akkılıç, op. cit., p. 17.

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poultry feed is poor in terms of protein especially in private feed industries. In future, the demand for feed will be much higher and the prices are expected to increase accordingly.<sup>1</sup>

<sup>1</sup> Devlet Plânlama Teşkilâtı, "İkinci Beş Yıllık Kalkınma Plânu Hakkında Konsorsiyum Raporu", Devlet Plânlama Teşkilâtı Dergisi (Ankara: Ayyıldız Matbaası A.Ş., 1968), p. 55.

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## GENERAL FEATURES OF BROILER PRODUCTION

Broiler production is a branch of the poultry meat industry. Broilers are quickly-grown birds which are marketed at approximately nine to eleven weeks. The most important strategy in the broiler industry is to provide the means of quicker growth which necessitates the use of high-protein and high-energy rations. The purpose of this is to reap the benefits of high feed conversion rate during the first few weeks of the life of birds.

### Production Methods.

One method of producing broilers is to rear three to five batches of chicks in a year. Each batch contains a large number of birds. For example, assume that a farm will market its broilers at the age of 12 weeks. In a year, four batches can be reared occupying a total of 48 weeks of production time. The remaining four weeks can be used for cleaning and for handling contingencies after the sale of each batch.

Another method is to employ a continuous type of production. In this type of operation, a smaller number of chicks can be started every month to give a desired total number of chicks for the year. New lots of chicks are put into the production process without waiting for the old ones to come to the age of marketing. An arrangement for production flow is prepared so as to make possible the displacement of old lots to larger houses when the new chicks are put into the process.

Selection of these alternatives is a matter of technical, financial, and marketing considerations. Given the market for broilers, management may choose one of these alternatives according to the technical capabilities of the farm and the comparative financial advantages of the selected alternative over the other. Supply of poultry meat shows great fluctuations over the year, due to the marketing of poultry meat mainly in late summer. For a continuous and steady supply of poultry meat, I would recommend the second type of production. It has a tendency to stabilize the fluctuations in supply and fits the nature of the production more than the first type of production does.

In this paper, the system for accounting will be based on the assumption that the farm is engaged in continuous production of broilers.

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## Production Processes and Flow of Products.

Broiler production can be divided into two main processes, namely, 'growing' and 'dressing'. The growing process involves the rearing of baby chicks up to the killing age. Depending on the frequency of purchases of baby chicks (monthly, semi-monthly, weekly, etc.), a different number of 'works-in-process' (broilers growing) is obtained at a given point of time. The principal inputs are baby chicks, feed, water, labor, and farm overhead. The main product of this process is 'broilers grown-up' which is to be transferred to the next department together with the valuable by-product, manure.

Feed costs comprise the highest percentage of the total production cost as explained in the introductory section. Feed has a double function, i.e., maintenance of bird life, and of growth. The goal is to achieve the maximum quantity of meat growth given the amount of feed and the rearing time.<sup>1</sup> The works, findings, and recommendations of geneticists, nutritionists, veterinarians, and manufacturers of basic resources affect this goal externally. Normally, the higher the price of broilers in relation to feed, the shorter the rearing period.<sup>2</sup> Therefore, in continuous production, the relative prices of variable inputs (especially feed), and broilers should be taken into account in the determination of the optimum killing age.

Finishing of grown-up broilers is left to the second process which involves killing, plucking, cleaning, and packing operations.<sup>3</sup> These four operations follow each other so closely that it is possible to gather them in one single process which I may call 'dressing'. The principal material input of this process is grown-up broilers which are transferred in from the previous process. An addition of materials for packing is made at the end of the process. During the processing of the final product, two by-products, namely, 'feathers' and 'inedible parts' are procured.

<sup>1</sup> E. O. Heady, S. Balloun, and R. J. Townsley, Cooperative Research on Input/output Relationships in Poultry Production (Paris: O. E. C. D. Publications, 1966), p. 18.

<sup>2</sup> E. S. Clayton, The Economics of Poultry Industry (London: Longmans, Green, and Co. Ltd, 1967), p. 96.

<sup>3</sup> A. A. McArdle, Poultry Management and Production (Sydney: Angus and Robertson Ltd., 1967), pp. 519-21.

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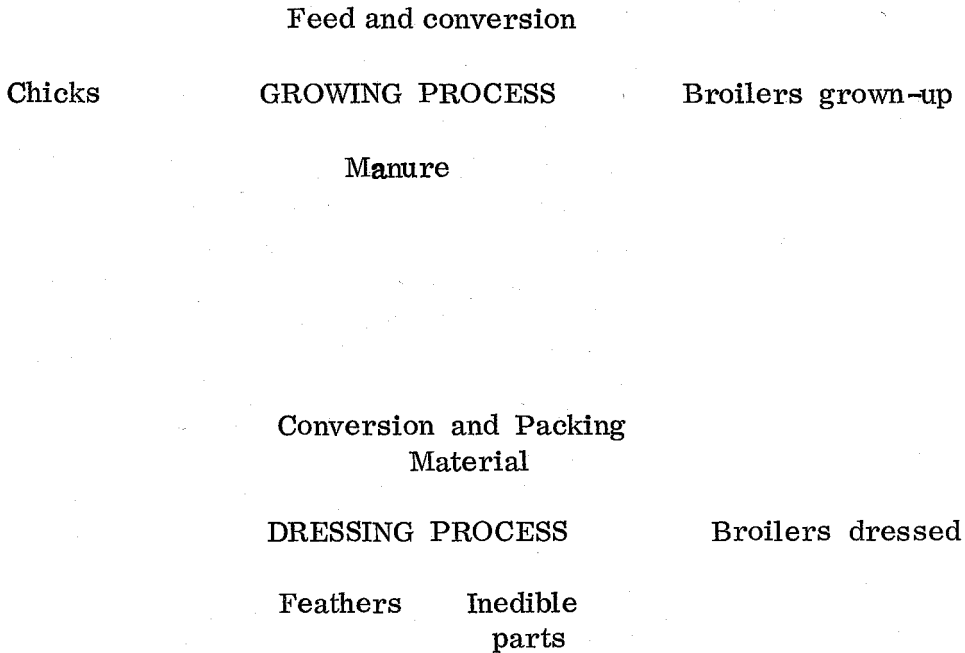


Figure 1. - Flow chart of continuous broiler production.

The dressing process necessitates the finishing of the four operations as soon as possible. The delay between the killing and plucking operations should be minimized in order to prevent any harm to the carcass. Similarly it is not desirable to have an in-process inventory between plucking and cleaning operations. The internal organs should be taken out at the cleaning operation immediately after the bird has been plucked. Due to this quick finish necessity of the dressing process, the assumption of no works in process holds perfectly true. Thus, broiler farms need not be taxed with the time-consuming calculations for work-in-process inventories in the dressing process.

For this reason, there remains only two types of in-process inventories to be treated for accounting purposes. One is the broilers growing which occurs in the growing process. The other one, broilers grown-up, exists between the two processes, and therefore it can be accepted as the finished product of the first process. For simplicity, broilers grown-up will be treated as a finished product throughout this paper.

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## ACCOUNTING FOR CONTINUOUS TYPE OF BROILER PRODUCTION

There is no rule at present for a sound treatment of the activities of a broiler farm. Production is kept low, sometimes on purpose, in order to be exempt from taxes on agricultural products. Furthermore, again to avoid taxation, some producers show high mortalities in their records which are far from being actual. The records are as simple as possible and provide the producers with almost no managerial data.

Yet by incurring only a very small cost of bookkeeping, farms that are exempt from tax, can control their activities and corresponding costs. The basic records needed are feed records, labor records, livestock reconciliation forms, and a book of cash flows. The total costs incurred during a period can be divided by the number of broilers to find an approximate cost of a broiler. Inventories of broilers are simply shown at their estimated market value.

In the subsequent sections of this chapter, a chart of accounts which is suitable for a big broiler farm will be presented, and some of the accounts related to production costs will be discussed. Since a continuous type of production is recommended, the accounting system will be 'process cost accounting' which has the main purpose of accumulating costs for a period of time by processes of growing and dressing.

### Chart of Accounts.

In order to furnish a farm with a good accounting structure, it is necessary to devise a suitable chart of accounts. The chart of accounts lists the accounts to be used with assigned account numbers. It is "... a uniform systematic listing of assets, liabilities, capital, income, and expenses in a logical order . . . so that financial statements may be extracted and prepared . . .".<sup>1</sup> The nature of a chart of accounts is dependent more on the type and complexity of the operations of the firm rather than its size. For each individual account, adequacy, accuracy, and clarity should be provided in order to have them mutually exclusive.

<sup>1</sup> Robert I. Dickey, Accountants' Cost Handbook (New York: The Ronald Press Company, 1960), p. 2.25.

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Preparation of a chart is an individual problem for a specific industry, because a chart for an industrial firm will not be usable for another one. In the broiler industry, the production process is simple since there is only one main product, and two processes are involved in the operations. Therefore, the design of the chart will be simple. In the following suggested chart group codes are used for coding the accounts.

## 100 ASSET ACCOUNTS

- 110 Cash
- 120 Marketable Securities
- 130 Receivables
  - 131 Accounts Receivable
  - 132 Notes Receivable
- 140 Inventories
  - 141 Raw Materials
    - 1411 Chicks
    - 1412 Feed
    - 1413 Litter
    - 1414 Packing Materials
  - 142 Goods in Process
    - 1421 Broilers Growing
    - 1422 Broilers Dressing
  - 143 Finished Goods
    - 1431 Broilers Grown-up
    - 1432 Broilers Dressed
  - 144 By-Products
    - 1441 Manure
    - 1442 Feathers
    - 1443 Inedible Parts
- 150 Prepaid Expenses
  - 151 Prepaid Insurance
  - 152 Supplies
    - 1521 Medicine and Disinfectants
    - 1522 Feed additions
  - 153 Prepaid Interest

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- 160 Fixed Assets
  - 161 Land
  - 162 Buildings
    - 162 A Allowance for Depreciation
  - 163 Furnitures and Fixtures
    - 163 A Allowance for Depreciation
  - 164 Autos and Trucks
    - 164 A Allowance for Depreciation
  - 165 Growing Equipment
    - 165 A Allowance for Depreciation
  - 166 Dressing Equipment
    - 166 A Allowance for Depreciation
  
- 200 LIABILITIES
  - 210 Current Liabilities
    - 211 Accounts Payable
    - 212 Notes Payable
    - 213 Accrued Payables
  - 220 Deferred Credits
  - 230 Fixed Liabilities
  
- 300 EQUITIES
  
- 400 REVENUE ACCOUNTS
  - 410 Broiler Sales (dressed)
    - 411 Returns and Allowances
    - 412 Discounts
    - 413 Cost of Dressed Broilers Sold
  - 420 Broiler Sales (undressed)
    - 421 Returns and Allowances
    - 422 Discounts
    - 423 Cost of Undressed Broilers Sold
  - 430 Manure Sales
    - 431 Returns and Allowances
    - 432 Discounts
    - 433 Cost of Manure Sold
  - 440 Feather Sales
    - 441 Returns and Allowances
    - 442 Discounts
    - 443 Cost of Feathers Sold

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- 450 Sale of Inedible Parts
  - 451 Returns and Allowances
  - 452 Discounts
  - 453 Cost of Inedible Parts Sold
- 460 Other Income

## 500 PRODUCTION AND EXPENSE ACCOUNTS

- 510 Stores
  - 511 Chicks
    - 5111 Returns and Allowances (Cr.)
    - 5112 Purchase Discounts (Cr.)
    - 5113 Freight in (Dr.)
  - 512 Feed
    - 5121 Chick feed
      - 51211 Returns and Allowances
      - 51212 Purchase Discounts
      - 51213 Freight in
    - 5122 Pullet feed
      - 51221 Returns and Allowances
      - 51222 Purchase Discounts
      - 51223 Freight in
  - 513 Litter
    - 5131 Returns and Allowances
    - 5132 Purchase Discounts
    - 5133 Freight in
  - 514 Packing Materials
- 520 Direct Labor
  - 521 Growing Department
    - 5211 Base Rate
    - 5212 Overtime
    - 5213 Premiums
    - 5214 Payroll Taxes

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## 522 Dressing Department

- 5221 Base Rate
- 5222 Overtime
- 5223 Premiums
- 5224 Payroll Taxes

## 530 Farm Overhead

### 531 Growing Department

- 5311 Supplies
- 5312 Indirect Labor
- 5313 Growing Houses
  - 53131 Insurance
  - 53132 Property Tax
  - 53133 Depreciation
  - 53134 Maintenance
- 5314 Growing Equipment
  - 53141 Insurance
  - 53142 Property Tax
  - 53143 Depreciation
  - 53144 Maintenance
- 5315 Power
  - 53151 Electricity
  - 53152 Fuel
- 5316 Water
- 5317 Normal Mortality

### 532 Dressing Department

- 5321 Supplies
- 5322 Indirect Labor
- 5323 Dressing Houses
  - 53231 Insurance
  - 53232 Property Tax
  - 53233 Depreciation
  - 53234 Maintenance
- 5324 Dressing Equipment
  - 53241 Insurance
  - 53242 Property Tax
  - 53243 Depreciation
  - 53244 Maintenance

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5325	Power
53251	Electricity
53252	Fuel
5326	Water
5327	Normal Spoilage

## 600 OPERATING EXPENSES

### 610 Selling Expenses

611	Sales Salaries
612	Advertising
613	Payroll Taxes
614	Depreciation of Selling and Delivery Equipment

### 620 General and Administrative Expenses

621	Salaries
622	Payroll Taxes
623	Depreciation
624	Bad Debts

### 630 Other Expenses

631	Extraordinary Mortalities
632	Extraordinary Spoilage
633	Other

## 700 PROFIT AND LOSS

In this chart the accounts which are related to costs are emphasized more than the others, and are showed in detail.

### Special Characteristics of Cost Accounts.

Discussion of non-cost items such as cash, liabilities, etc. can be found in any text of general financial accounting. In this section, I will discuss the accounts which are directly related to the cost of the broilers.

Following the rules of conventional cost accounting, selling and administrative expenses should be treated as operating expenses rather than as

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product costs. If the costs are assignable to the units produced, then they can be grouped under 'inventoriable' or 'product' costs. These costs can be accepted as assets until the products with which they are assigned are sold. On the other hand, operating expenses are not product costs, but period costs. The reasons for differentiating between the two are: (1) difficulty of selecting equitable basis for the allocation of operating expenses to products, (2) independence of the majority of the operating expenses from the level of production, and (3) many of these expenses are incurred for future sales.<sup>1</sup> Although many arguments take place on this problem, in the specific topic of broiler production, these costs, whenever equitably and reasonably identified with the product, will be treated as inventoriable costs under the method of absorption costing.

## Inventories.

In the preceding section four main categories, namely, raw materials, goods in process, finished goods, and by-products have been established under the caption of inventories. In this chapter, only the first three of these will be discussed, thus leaving the discussion of by-products to a separate chapter on by-products.

Because of its advantage of providing a continuous check and immediate data concerning the position of inventories, 'perpetual inventory' method is recommended and will be used in this paper. A perpetual inventory system offers a running summary of inventory items. In the individual inventory accounts increases and decreases in stocks are recorded, and the resulting balance shows the amount in hand. At the time of sale, as soon as the sale is recorded, another entry is made by debiting 'cost of goods sold' and crediting the related inventory account.

For inventory valuation fifo method will be used. The nature of broiler industry fits to the assumption that costs are to be charged out in the order in which they were incurred. Fifo values the inventories at the most recent costs. This assumption is strongly valid especially in the valuation of feed, undressed broilers, and chick inventories. For example, feed is a substance which contains vitamin elements in it. These vitamins begin to lose their active elements two three months after their fabrication. Therefore, a broiler farm normally at first uses up the feed which was bought at an earlier date, thus charging the cost of the earlier bought feed to the cost of broilers sold. Then, the feed cost appearing

<sup>1</sup> John G. Blocker and W. Keith Weltmer, Cost Accounting (New York: McGraw-Hill Book Co., Inc., 1954), p. 15.

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in the inventory reflects the cost of the feed that was bought most recently.

The same conclusions about the fifo method can be drawn with greater conviction with respect to the inventories of finished broilers. Assume that a farm buys baby chicks every week, and at the end of a growing period of two and one-half months the birds are killed and finished. This means that if the batch of chicks were bought on February 1, then, they must be transferred to the dressing process on April 15, and the chicks of February 8 must be sent to dressing on April 22. It is obvious that the first batch will be transferred to the next process first.

Furthermore, fifo does not give different results whether a perpetual or periodic inventory system is used.<sup>1</sup> For these reasons, once the fifo is chosen, the decision as to whether to use perpetual or periodic inventory system is left to the preferences of the management.

Chicks Inventory. - This is a peculiar inventory item in the sense that it can hardly exist on the position statements. This fact is due to the special characteristic of broiler production that as soon as the farm buys and begins to feed the chicks, the chicks are included in the 'Goods in process (broilers growing)' inventory. Normally, the day-old chicks are put in brooders as soon as they are received. When the purchase is made 'Chicks' is debited and 'Cash' is credited. On the arrival and placement of chicks, 'Broilers Growing' is debited and chicks inventory is credited.

There is **one** possible exception to the above-mentioned treatment of chicks. Newly-born chicks are not fed for 48 hours after being hatched because for technical purposes it is desirable to let them digest the yolk they consumed in the egg shell before their birth. Instead of being fed they are kept in brooders or hatcheries for some 12-18 hours for drying up and resting. The chicks do need rest because they make tremendous efforts to break the egg shell during their birth. Some of them may faint due to fatigue. Therefore, assuming that the broiler farm has acquired the chicks 12 hours after their birth, there remains approximately 36 hours during which the chicks will not eat anything. If we assume that

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<sup>1</sup> Harold Bierman, Jr., Financial and Managerial Accounting (New York: The Macmillan Company, 1966), p. 186.

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all other costs can be ignored, then it is possible to have a chicks inventory. This fact can be illustrated by a simple example. Suppose that the firm has bought 5,000 chicks at 2,-TL. on December 31, 1969. The entry to record the transaction will be:

Inventory - Chicks	10,000.-	
Payables		10,000.-
to record the purchase of chicks		

This inventory will show up in the position statements, and on the next day, the chicks will be put in growing process.

Broilers Growing	10,000.-	
Inventory - Chicks		10,000.-
to record the entry of 5,000 chicks into the growing process		

It is my recommendation that even though there is a very little possibility of purchasing a flock of chicks on the last day of the accounting period, chicks inventory account should be kept for information and control purposes.

Feed Inventory. - Feed is the most important component of the broiler production costs. Two different types of feed inventories are kept, one for chick feed and the other for pullet feed. In the subsequent analyses one single feed account is employed for simplicity.

Feed is consumed only during the process of growing. It is not added to process at a specific time, but continuously. Because of this nature of feed it is treated as a conversion cost rather than material cost. The appropriate entries for feed movements would be as follows :

512 Feed	x x x	
110 Cash		x x x
to record the purchase of feed		
1421 Broilers Growing	x x x	
512 Feed		x x x
to record the feed requested by growing department		

Litter Inventory. - Litter is a material which is put onto the floor of growing houses for sanitary purposes. It consists of straw,

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sawdust, or some other material. Litter becomes a good fertilizer at the end of its usage. Since the manure is sold together with litter, in this paper, litter will be treated as the direct cost of manure. These entries can be made for litter movements :

513 Litter	x x x	
110 Cash		x x x
to record the purchase of litter		
1441 Manure	x x x	
513 Litter		x x x
to charge the cost of litter to manure		

Another alternative is to use a transitory account 'Litter in Houses' for the litter which is still in the growing houses. This is a more accurate alternative, because it makes possible to trace the flow of litter better. Under this method, litter in houses account is credited when the ground material is taken out of the houses.

Packing Materials. - These are used at the end of the whole process of dressing. Entries for packing materials :

514 Packing Materials	x x x	
110 Cash		x x x
to record the purchase		
1422 Broilers Dressing	x x x	
514 Packing Materials		x x x
to record the Packing materials uses.		

Broilers Growing. - This account reflects the cost items put into the growing process. The related entries are :

1421 Broilers Growing	x x x	
511 Chicks		x x
512 Feed		x x
521 Direct Labor - Growing		x x
531 Farm Overhead- Growing		x x

to record the costs put into the process

Here, the accounts numbered 521 and 531 are periodically assigned to the process.

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1431 Broilers grown-up                    x x x  
    1421 Broilers Growing                    x x x  
    to record the finished product of the growing process

If there is a sale of undressed broilers ,

110 Cash  
    420 Broiler Sales (undressed)                    x x x  
    to record the sale

423 Cost of Undressed Broilers Sold                    x x x  
    1431 Broilers Grown-up                    x x x  
    to transfer the cost of growing to cost of broilers sold

Broilers Dressing. - This is the work in process account of the second process. The entries for the activities related to this account are as follows :

1422 Broilers Dressing                    x x x  
    1431 Broilers Grown-up                    x x  
    522 Direct Labor- Dressing                    x x  
    532 Farm Overhead-Dressing                    x x  
    514 Packing Materials                    x x  
    to record the costs put into the process

Here, also, direct labor and overhead are applied periodically.

1432 Broilers Dressed                    x x x  
    1422 Broilers Dressing                    x x x  
    to record the finished product of the final process

Broilers Grown-up. - This account shows the amount of finished product of the growing process at the cost of production. The entries related to this account have been presented in the accounting for Broilers Growing and Broilers Dressing.

Broilers Dressed. - This is the account for the final product of the farm. Entries for the movements of this item :

1432 Broilers Dressed                    x x x  
    1422 Broilers Dressing                    x x x  
    to record the finished product of the final process

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At the time of sale,

110	Cash	x x x	
	410	Broiler Sales (dressed)	x x x
	to record the sale		
413	Cost of Dressed Broilers Sold	x x x	
	1432	Broilers Dressed	x x x
	to transfer the production cost to the cost of broilers sold		

## Conversion Costs.

Direct labor and overhead costs make up the remaining portion of the total production costs. They are called simply conversion costs because the costs represented by them are added to the processes continuously.

Direct labor is calculated from the farm payroll for each process. The journal entries for base rate labor :

520	Direct labor	x x x	
	2133	Wages Payable	x x x
	to record the direct labor accrued for the period		
142	Goods in Process	x x x	
	520	Direct Labor	x x x
	to transfer the labor costs to the processes		

Accounting for other labor costs are treated in the same manner as the one presented above. A more sound and informative method is to treat the premiums, overtime, and vacation pays as overhead items.<sup>1</sup>

Overhead costs are the ones that cannot be classified under either materials or labor. Illustrative entries for several overhead items :

5312	Indirect Labor - Growing	x x x	
5322	Indirect Labor - Dressing	x x x	
	2133	Wages Payable	x x x
	to record the accrual of indirect labor for the period		

<sup>1</sup> Morton Backer, and Lyle E. Jacobsen, Cost Accounting - A Managerial Approach ( New York : McGraw-Hill Book Company, Inc., 1964), 104.

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1421	Broilers Growing	x x x	
1422	Broilers Dressing	x x x	
5312	Indirect Labor-Growing		x x x
5322	Indirect Labor-Dressing		x x x

to transfer the indirect labor costs incurred to the processes

Similar entries are made to record the incurrence of charges for other items of overhead accounts.

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## PROCESS COSTING FOR BROILER FARMS

The theory on which the process cost accounting is based is that the average costs are of primary interest to the firm. The units processed in a department are assumed to be homogeneous, that is, the output consists of identical units, and each unit is processed in the same manner.<sup>1</sup> In a process cost system, material, labor, and overhead are accumulated by processes on a time basis. Then these costs are averaged by dividing them by the output which can be obtained from production reports. The accumulated costs must follow the production flow, and should be transferred from one process to the next as the product is transferred.<sup>2</sup>

Broiler production fits for the requirements of the process cost accounting system. First, the operations can be defined by the processes of growing and dressing. Second, the products, that is, broilers, are homogeneous in nature. Third, each unit is processed in the same manner and the farm is concerned with mass production of broilers.

The two processes of the operations follow each other. Since the finished product of the growing process is the raw material for the dressing process, the accounting system for this type of production can be classified as 'sequential process costing'.<sup>3</sup> Furthermore, the specific type of the system fits the 'single-product, double-process' type.<sup>4</sup> An illustration of the flow of costs is presented on the next page.

### No Goods-in-process Inventories.

I shall begin the discussion of process costing of broilers with a simplified example. In this model, it is assumed that there will be no beginning and ending goods-in-process inventories in either process, and no

<sup>1</sup> Robert N. Anthony, Management Accounting - Text and Cases (Homewood, Illinois : Richard D. Irwin, Inc., 1964 ), 421.

<sup>2</sup> Theodore Lang, Cost Accountants' Handbook ( New York : The Ronald Press Company, 1944 ), 425.

<sup>3</sup> Robert I. Dickey, op. cit., 12.4.

<sup>4</sup> John G. Blocker and W. Keith Weltmer, op. cit., 231.

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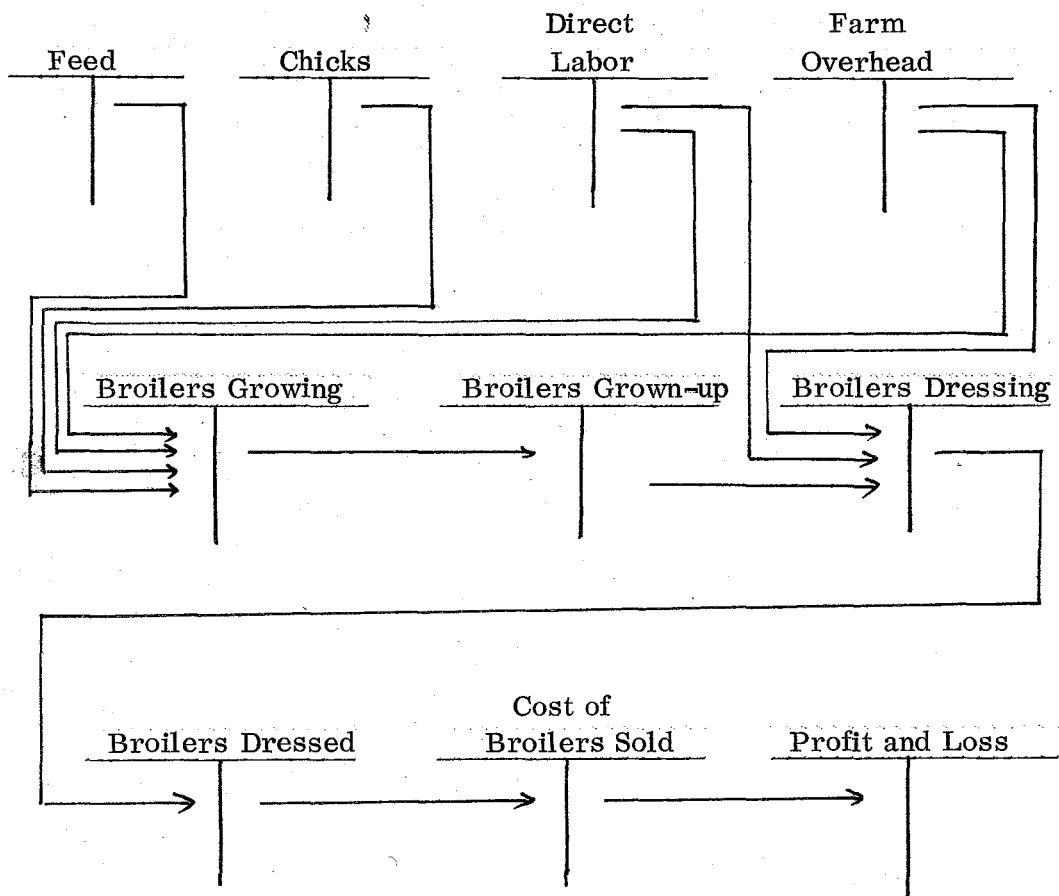


Figure 2. - Flow of Costs in a Broiler Farm.

mortalities and spoilage. Later, these assumptions will be relaxed and the full system will appear.

Let us suppose that at the end of the period the following costs were recorded :

Chicks	200,000 TL.	
Feed	600,000	
Conversion-Growing	100,000	
Conversion-Dressing	60,000	
Total number of broilers grown-up and sold		100,000 units

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The unit cost of undressed broilers which were obtained at the end of the growing process is found as follows :

Cost of production :

Chicks	200,000 TL.
Feed	600,000
Conversion	<u>100,000</u>
	<u>900,000 TL.</u>

Unit cost of undressed broilers      900,000 / 100,000      9. - TL.

This cost is transferred to the killing department and,

Broilers grown-up	900,000 TL.
Conversion- Dressing	<u>60,000</u>
	<u>960,000 TL.</u>

Unit cost of Broilers Dressed      960,000 / 100,000      9.60 TL.

Sometimes these data and findings are summarized in a process cost report which shows the overall situation in a tabular form,<sup>1</sup>

The general journal entries for the activities of the year are as follows :

Broilers Growing	900,000	
Chicks		200,000
Feed		600,000
Conversion-Growing		100,000
to record the costs of growing transfers into the broilers growing		
Broilers Grown-up	900,000	
Broilers Growing		900,000
to record the finished product of the growing process		
Broilers Dressing	960,000	
Broilers Grown-up		900,000
Conversion-Dressing		60,000
to transfer the dressing costs to the dressing process		
Broilers Dressed	960,000	
Broilers Dressing		960,000
to transfer the total production costs to the finished product		

<sup>1</sup> John G. Blocker and W. Keith Weltmer, op. cit., 232.

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In this procedure costs of chicks, feed, conversion incurred can be collected in a production ledger which is a subsidiary ledger to the general farm ledgers.

## Unit Cost with Goods-in-process Inventories.

At this point the assumption of no goods in process is relaxed. In such a situation, since all broilers are not completed in the process, the farm is faced with the problem of allocating the total production costs between the broilers undressed and broilers growing for the growing process. The problem of allocation is the same for the dressing process, therefore, in this section and the other, only the solution for the growing process will be presented.

The problem of allocation is best achieved by expressing the work of the growing department in terms of a common denominator which will be called "equivalent units of production".<sup>1</sup> Equivalent unit of production ". . . represents the number of complete units that would have been produced if all the work performed during the period had been applied to units which were begun and finished during the period".<sup>2</sup>

Suppose that a specific farm had a beginning broilers growing inventory of 20,000 units, 40 percent completed, and an ending inventory of 10,000 units, 80 percent completed. It is again stressed that only chick costs are added at the beginning of the process, and feed is treated as a conversion cost assuming that the rates of conversion for feed and other conversion costs are the same. Further assume that 100,000 chicks were started, and 110,000 were grown up and transferred to the dressing department in the period in question. The cost data appears as follows:

Broilers Growing (20,000 units, 40% complete)		
Chicks	40,000 TL.	
Conversion	<u>48,000</u>	88,000 TL.
Chicks started		200,000
Conversion		<u>600,000</u>
Total cost of growing		<u>888,000 TL.</u>

The problem is to allocate this cost to the broilers grown-up and transferred, and to the ending inventory of broiler growing.

<sup>1</sup> Charles T. Horngren, Cost Accounting - A Managerial Emphasis (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1962), 75.

<sup>2</sup> Robert I. Dicker (ed.), op. cit., 12. 18 .

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Since the chicks are put into the production at the beginning of the process, the ending and beginning inventories of broilers growing are complete with respect to chicks. Same argument is valid for broilers grown-up which are started and finished during the period. On the other hand, the conversion cost of 600,000 TL. is incurred to : (1) finish and transfer the 60% of the beginning inventory of broilers growing of 20,000 units, (2) start and grow up 90,000 (110,000 minus 20,000) units of broilers, and (3) start and complete the 80% of the ending inventory of broilers growing of 10,000 units. The equivalent units of production is found as follows :

	Chicks	Conversion
Broilers growing, beginning, to finish the 60% portion	0	12,000
Chicks started and grown-up	90,000	90,000
Broilers growing, ending, to finish the 80% portion	10,000	8,000
Equivalent units	100,000	110,000

**Unit Costs :**

Chicks ( 200,000 / 100,000)	2. -TL	
Conversion (600,000 / 110,000 )		5.45TL.

After finding the unit costs the apportionment is simple.

**Broilers grown-up and transferred:**

Broilers growing, beg <sup>g</sup>		88,000 TL.
Cost to complete the 60% portion :		
Chicks		0
Conversion (12,000 units at 5.4545 )		65,454.54
		153,454.54
Chicks started and grown up ( 90,000 u. at 7.4545 )		670,909.10
		824,363.64

**Broilers growing, end.:**

Cost to complete the 80% portion :		
Chicks (10,000 units at 2. - TL.)		20,000. -
Conversion (8,000 at 5.4545 )		43,636.36
Total cost accounted for		888,000. -

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The journal entries for the activities are as follows :

Broilers Growing	65,454.54	
Conversion		65,454.54
to record the costs incurred to complete the 60% portion of broilers.		
Broilers Grown-up	153,454.54	
Broilers Growing		153,454.54
to transfer the broilers growing to the broilers grown-up.		
Broilers Growing	670,909.10	
Chicks		180,000
Conversion		490,909.10
to record the costs incurred to start and grow up 90,000 chicks.		
Broilers Grown-up	670,909.10	
Broilers Growing		670,909.10
to transfer the broilers growing to broilers grown-up.		
Broilers Growing	63,636.36	
Chicks		20,000
Conversion		43,636.36
to record the costs incurred to start and complete the 80% portion of broilers.		

## Unit Costs with Mortality and Spoilage.

Up to this stage, the unit cost calculations have been made without considering the effects of mortality. During the growing process it is unavoidable to have some dead units. A death rate of five or six percent may not seriously increase the production costs, whereas high levels (15-25 percent) will certainly influence the total production costs. According to McArdle ". . . mortality should be kept under 10 percent, if possible, and not be over 15 percent." <sup>1</sup> In this paper, a mortality rate of 10 percent is accepted as 'normal rate of mortality' in accordance with the general trend in Turkey. <sup>2</sup>

<sup>1</sup> A. A. McArdle, op. cit., 479.

<sup>2</sup> Interview with Mr. Vasfi Hakman, owner and manager of the Çiftlik, January 20, 1969.

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However, especially when large batches ( above 1,500 per house at a time ) are housed, the mortality rate can well be high due to diseases in commercial broiler flocks. In such cases the losses are treated as 'abnormal mortality' which ". . . is regarded unnecessary and thus controllable costs even in the short run." <sup>1</sup>

Spoilage may occur both in growing and dressing processes. During their growing the birds get used to feather picking and cannibalism that may cause spoilage by affecting the appearance of the carcass. Furthermore, when the birds are in the dressing process, some defects and spoilage occurs due to occasional faults in dressing. Spoilage has the effect of lowering the market value of broilers, whereas mortality results in the complete loss of value.

In accounting there are two ways of dealing with the mortality. First, the costs of normal mortalities are applied only to the 'good' broilers produced, thus increasing the unit cost of good broilers. This is because costs of normal mortalities can be accepted as inseparable parts of the costs incurred for growing good broilers since the production of good broilers makes the simultaneous occurrence of mortalities necessary. Secondly, the abnormal losses should be debited to the 'extraordinary Mortalities' account below the net operating income in order to be distinguished easily.

The example given below assumes a unit cost of 9. -TL. excluding the mortality allowance. Furthermore, the following data are available:

	<u>Units</u>	<u>Costs</u>
Good broilers grown-up	70,000	630,000 TL.
Normal mortality	9,000	81,000
Abnormal mortality	<u>11,000</u>	<u>99,000</u>
Broilers processed	<u>90,000</u>	<u>810,000 TL.</u>

The entries for the activities during the period are as follows :

Broilers Growing	810,000	
Chicks and Conversion		810,000
to record the 90,000 chicks processed		

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Broilers Grown-up	711,000	
Broilers Growing		711,000

to transfer the 70,000 good broilers processed and 9,000 broilers died to finished product.

Extraordinary Mortality	99,000	
Broilers Growing		99,000

to record the abnormal mortality of 11,000 birds.

In this simple example, goods-in-process inventories were ignored. It is presented just in order to show the journal entries for the activities. Employing the realistic assumption of 'losses during the process' I will present, now, the complete system for growing process including goods in-process inventories and mortalities.

Suppose that the following cost and production data are available :

## Costs :

Broilers Growing, beginning :		
Chicks		10,000 TL.
Conversion		6,000
		<hr/>
		6,000 TL.
Chicks started and processed :		
Chicks		210,000
Conversion		624,000
		<hr/>
Total		<u>850,000 TL.</u>

## Units of Production :

Broilers Growing, beginning, 20% completed	5,000
Chicks started	100,000
Broilers Grown-up	90,000
Broilers Growing, ending, 75% completed	8,000
Normal Mortality	7,000

The problem is to find the costs of the broilers grown-up, and the ending inventory of broilers growing. The solution again begins with the computation of the equivalent units of production.

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	Chick	Conversion
Broilers Growing, beginning, to finish the 80% portion	0	4,000
Chicks started and grown-up (100,000 - 7,000 - 8,000)	85,000	85,000
Broilers Growing, ending, to finish the 75% portion	8,000	6,000
Equivalent Units	93,000	95,000

**Unit Costs:**

Chicks ( 210,000 / 91,000 )                      2.258 TL.

Conversion ( 624,000 / 95,000 )    6.5684 TL.

Applying these unit costs, the cost of the ending inventory of broilers growing, and the cost transferred to the killing department are found.

**Broilers grown-up and transferred to the dressing department :**

Broilers Growing, beginning, to complete  
the 80% portion :

Chicks	0	
Conversion ( 4,000 at 6.568 )	26,275.60	26,275.60

Broilers Growing, beginning,		16,000
		42,275.60

Chicks started and grown-up ( 85,000 at 8.8264 )		750,246.-
		792,521.60

Broilers Growing, ending  
Cost to complete the 75% portion :

Chicks ( 8,000 at 2.258 )	18,066	
Conversion ( 6,000 at 6.5684 )	39,412.40	57,478.40
		850,000.-

**The journal entries for the activities are :**

Broilers Growing	26,275.60	
Conversion costs		26,275.60
To record the conversion costs incurred to finish the 80% portion.		

Broilers Grown-up	42,275.60	
Broilers Growing		42,275.60
To transfer the finished product from the process to the appropriate account.		

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Broilers Growing	750,246. -	
Chicks and Conversion		750,246. -
to record the production costs incurred to start and finish 85,000 chicks.		
Broilers Grown-up	750,246. -	
Broilers Growing		750,246. -
to transfer the finished broilers from the process to the appropriate account.		
Broilers Dressing	792,521.60	
Broilers Grown-up		792,521.60
to record the transfer of grownup broilers to the dressing dept.		
Broilers Growing	57,478.40	
Chicks		18,066. -
Conversion		39,414.40
to record the costs incurred to finish 75% portion of the ending inventory of broilers growing.		

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## TREATMENT OF BY-PRODUCTS

By-products are recovered from the production of the major product. The principal by-products of the broiler industry, namely manure, feathers, and inedible parts were disclosed in the proposed chart of accounts under the caption of inventories. In this chapter, the by-products will be analyzed with respect to their relationships to the processes. Manure is the by-product of the growing process whereas feathers and inedible parts are by-products of the dressing process.

### Economic Importance of Broiler By-products.

The first one, poultry manure, has an excellent fertilizer value with its nitrogen, phosphorus, and potassium contents. Under the deep-litter system, 1,000 broilers reared to 3 months produce approximately 3 tons of manure.<sup>1</sup> One ton of dry poultry manure with a 25-35% water content, contains roughly 40 kg. of nitrogen, 20 kg. of potassium, and 20 kg. of phosphorus.<sup>2</sup>

Feathers, one of the by-products of dressing process, are additional sources of revenue for broiler farms. There is a market for poultry feathers which consists mainly of manufacturers of pillows and mattresses. The feathers that are plucked from the chests and backs are more valuable than those plucked from the other parts of the bird. However, in this paper it is assumed that the broiler farm will not have a process for separating these two types of feathers, but rather sell them mixed.

The inedible parts which consist of heads, legs, blood, and some internal organs, can be used as animal feed, fertilizer, and raw materials for some industries. The accountingwise treatment of inedible parts has the same characteristics with that of feathers in the sense that the costs are incurred in the dressing process, therefore a separate analysis for inedible parts will not be made.

<sup>1</sup> A. A. McArdle, op. cit., 510.

<sup>2</sup> Robert H. Adolph and E. C. Moore, Poultry Manure as A Fertilizer (San Diego, Calif.: Agricultural Extension Service, University of California), one-page mimeograph.

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## Accounting for By-products.

There are several methods which are developed for by-product accounting. The following methods are typical ones used in accounting practice.

### Other Income Method.

Net sales of by-products are transferred to profit and loss account, and the proceedings are shown as other income in the income statement. One criticism of this method is that it overestimates the inventory of the major product because no value is given to the by-product inventories. Secondly, no entry is made for by-products at the time of production, but only at the time of sale the transaction is recorded. This is a misleading treatment unless both the production and sales occurred in the same period. Finally, control is impossible since no inventory accounts are kept for by-products. Other income method is simple, but, on theoretical grounds, not dependable at all.

### Total Cost Less Revenue from the Sale of By-products.

Application of this method is based on the assumption that revenue from the by-products reduces the production costs of the main product. In this method, 'cost of goods sold' is decreased by the amount of by-product revenue. For this reason it tends to understate the cost of main product. Moreover, depending on the varying amounts of by-product sales, cost of main product changes.

In a variation of this method, 'Total Cost Less Value of By-products (including selling and administrative expenses)', selling and administrative expenses connected with the handling of the by-product, are charged when the by-product is sold. The difference between the by-product revenue and the portion of the selling and administrative expenses is credited to the cost of major product.

### Total Cost Less Value of By-products (including subsequent costs thereafter).

This method takes care of both the selling and administrative expenses and production costs subsequent to the split-off point. Since all of the joint costs are charged to the main product, only the subsequent finishing costs are debited to the by-product inventory. When the by-products are sold, the relevant portion of the selling and administrative expenses and subsequent costs are charged.

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Conceptually, the last method is more favorable than the others. However, for practical purposes, the first method may well be applied in <sup>the</sup> broiler industry, because inventories of manure and feathers constitute a rather small part of the whole activity.<sup>1</sup>

## Accounting for Manure.

Under the deep-litter system of broiler production, cost of litter can be accepted as the major portion of the cost of manure. In the simplest way, assume that the cost of litter used during the period amounted to 800 TL. Broilers increased the value of this litter by excreting fresh droppings on it through the usage time. Therefore litter is ~~is~~ the raw material for manure which is transformed into fertilizer by broilers. Further assume that 250TL. of labor was incurred to carry the used ~~up~~ litter outside the growing houses. The manure obtained in this way was sold for 1,500TL.

First of all, litter becomes an inventoriable cost, and the amount of litter requested by the growing department from the stores is directly charged to the inventory of manure. Therefore, the entries will be as follows :

Litter	x x x	
Cash or Payables		x x x
to record the purchase of litter.		
Litter in Houses <sup>2</sup>	800	
Litter		800
to record the litter requested by the growing dept.		
Manure	1,050	
Litter in Houses		800
Cleaning Expense		250
to record the taking of manure out of growing houses.		
Cash	1,500	
Manure Sales		1,500
to record the sale		

<sup>1</sup> Charles T. Horngren, op. cit., 458.

<sup>2</sup> See page 23.

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Cost of Manure Sold	1,050	
Manure		1,050
to close the inventory of manure.		
Manure Sales	1,500	
Broilers Grown-up		450
Cost of Manure Sold		1,050
to credit the net revenue to broilers grown-up.		

This procedure treats the manure as another main product, because the litter costs can be identifiable directly with manure. On the other hand, this method is simple and conceptually closer to the real nature of the process.

## Accounting for Feathers.

The method used in the section above, when applied to feathers, may not be as useful as the previous application. First, it is clear that manure is produced only in the growing process, ignoring the amount of manure which is obtained during the dressing process when the intestines of the birds are cleared of the non-excreted excrements. Although feathers appear and grow in the growing process, plucking costs are incurred in the dressing process. Secondly, it is hard to assign an inventoriable cost to feathers which can be conceptually correct and practically worthwhile.

One method of accounting for feathers makes use of the costs of plucking the birds. The labor and overhead incurred during the sub-process of plucking, and the costs of handling the feathers are debited to the 'feathers' account. Other costs of dressing process are charged to the cost of the main product. Suppose that the costs of plucking amounts to 270 TL., and the selling price of raw feather is 8 TL. per kilogram. At the end of a growing period of three months 900 birds were plucked, each bird having a yield of 30 grams of feather. The related journal entries are :

Feathers	270	
Plucking costs		270
to record the production of feathers.		
Cash	216	
Feather Sales		216
to record the sale of 27 kg. of feathers at 8TL per kg.		

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Cost of Feathers Sold	270	
Feathers		270
to close the feathers inventory.		
Feather Sales	216	
Broilers Dressed	54	
Cost of Feathers Sold		270
to transfer the difference of feather sales and cost of feathers sold to broilers dressed.		

In this procedure, the cost of plucking, 270 TL., is deducted from cost of broilers dressed and treated as the cost of feathers. At the sale of feathers, 216 TL. is procured and the difference, that is, a debit of 54 TL. is charged to broilers dressed account. This is a good approximation as long as no beginning and ending inventories of feathers and of broilers dressed exist. If we have these inventories, current costs of broilers and revenues from feather sales cannot be matched. If, for example, the broiler farm has an ending feathers inventory of 100 TL. at cost, the sale of these feathers is likely to take place in the next period, resulting in a cost reduction of the next year's broilers, although the feathers belong to this year's broilers.

To eliminate this limitation, the ending inventory <sup>of</sup> broilers dressed is based on the net costs of production rather than gross costs. Feathers are carried on at their net realizable value instead of the costs of plucking. Therefore the cost reduction power of feather sales against the production costs of broilers dressed are matched. The following example presented below assumes the following data with no beginning inventories :

	<u>Units :</u>	<u>Costs :</u>
<b>Broilers Dressed :</b>		
Production	200,000	1,200,000 TL.
Sales	190,000	1,140,000
Ending Inventory	10,000	
Sales Revenue		1,900,000
Cost per unit	6. -TL.	
Selling price	10. -TL.	

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Feathers :	<u>Units :</u>	<u>Costs :</u>
Production (200,000 x 0.03kg.)	6,000kg.	6,000 TL.
Sales	4,000	4,000
Ending inventory	2,000	2,000
Sales Revenue		32,000
Cost per kg.           1. -TL.		
Price per kg.         8. -TL.		

The problem is to make journal entries and find the values of the net production cost of broilers dressed and the ending inventory of broilers dressed.

The income statement would be as follows :

Broiler Sales		1,900,000 TL.
Cost of Sales :		
Production Costs	1,200,000	
Net realizable value of feathers produced :		
Net income from sales	28,000	
Realizable value of ending inventory	<u>14,000</u>	<u>42,000</u>
Net production cost of broilers dressed ( at 1,158,000/200,000 =5.79 TL.per bird)	1,158,000	
Ending inventory, broilers dressed (10,000 x 5.79 )	<u>57,900</u>	<u>1,100,100</u>
Net Income for the Year		<u><u>799,900 TL.</u></u>

The corresponding journal entries for the activities will be as follows :

Feathers	6,000	
Overhead - plucking		x x x
Labor - plucking		x x x
to transfer the feathers to inventory.		

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Cash	32,000	
Feather Sales		32,000
to record the sale.		
Cost of Feathers Sold	4,000	
Feathers		4,000
to transfer the cost from the feathers inventory.		
Feather Sales	32,000	
Cost of Feathers Sold		4,000
Broilers Dressed		28,000
to transfer the net income of feather sales to the cost of broilers dressed.		
Feathers	14,000	
Broilers Dressed		14,000
to transfer the net realizable value of the ending inventory of feathers to the cost of broilers dressed.		
Cash	1,900,000	
Sale of Broilers Dressed		1,900,000
to record the sale of broilers dressed.		
Cost of Dressed Broilers Sold	1,100,100	
Broilers Dressed		1,100,100
to transfer the production costs.		
Profit and Loss	1,100,100	
Cost of Dressed Broilers Sold		1,100,100
to close the account.		
Sale of Broilers Dressed	1,900,000	
Profit and Loss		1,900,000
to close the account.		

Although the above analysis applies to feather sales, same procedures can be applied to the accounting for inedible parts, and for manure. In such a case, the revenue from the sale of manure less the costs of litter and disposal is deducted from the total cost of dressed broilers. It is more simple because it does not involve the complications which arise due to the unavoidable existence of goods-in-process inventories of the farm.

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## CONCLUSIONS

The main idea upon which the accounting system for a broiler farm rests has been the application of process costing. For purposes of inventory costing and income measurement the use of unit costs of broilers is necessary. Process costing assumes that the average unit costs may be suitable for the attainment of the goals of accounting.

However, there are some limitations on using average unit costs, especially when the managers are interested in cost control and decision making. Unit cost data are likely to present some deficiencies in the following manners:

1. - In some important problems in decision making the relevant costs are incremental or added costs, rather than average costs.
2. - At the end of the preceding analyses, we obtained total unit costs of broilers which included both direct and indirect costs. Indirect costs are not relevant from the point of view of decision making and cost control. Allocation of costs is a rather insufficiently precise procedure for the two proposed purposes. Control by managers over the allocated costs is normally little.
3. - When predetermined farm overhead rates are used, the budgeted level of capacity is considered to be the basis for these rates. However, there may certainly be significant changes in unit costs depending on the difference between the budgeted and actual level of production.
4. - Calculation of the equivalent units of production is based on judgment rather than precise measurements of the stage of completion.
5. - Process cost complexities and difficulties begin to arise when there is more than one type of product.

Even though these limitations may hold true for the general outlook of the system, our specific concern of the broiler industry eliminates many of them. First, the fifth limitation is inapplicable since the broiler farms generally produce only one product.

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The fourth limitation is also not a serious one for the broiler industry since the stage of completion of a given lot of broilers can be estimated with almost exact accuracy. Once management has decided when to kill the birds, the magnitude of period costs to be allocated to the partially finished broilers is easy to find. First, the amount of feed and water (direct and variable costs) consumed per week are known to the management by the aid of various tables.<sup>1</sup> Therefore, the percentage of feed and water consumed can be determined. Secondly, allocated costs will present the same difficulty anyway, regardless of whether the farmer abstains from calculating the equivalent units or not.

The third limitation talks about the results of the differences between the budgeted and actual levels of production. In this paper, no attempt has been made to support the use of predetermined farm overhead rates. The paper deals with historical costs which provide the management with end-of-period results.

In the first and second arguments, treatment of allocated costs are shown as a limitation to process costing. It is true that approximations are involved when the fixed elements of costs are allocated. A possible way of overcoming this limitation is to separate the costs into fixed and variable components, and to find the unit cost accordingly.

In order to be clear and precise, this paper has attempted to ignore some facts concerning the computation of unit costs. In this respect, I have excluded the cost of water from the direct costs and put it under the farm overhead account. A production manager wanting to keep exact records, can by use of a water gauge check the daily amount of water drunk by birds. The gauge can be installed separately to record only the water consumed directly. Then, the assignment of this cost at any point of time becomes possible. The journal entries would be as follows:

Broilers Growing	x x	
Water Consumed Payable		x x
to record the water drunk during the week		
Water Consumed Payable	x x	
Cash		x x
to record the payment for water.		

<sup>1</sup> E.S. Clayton, The Economics of Poultry Industry (London: Longmans, Green, and Co. Ltd., 1967), pp. 150-51.

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Secondly, the rate of feed consumption is assumed to be the same as the conversion cost rate which is not necessarily true. However, as explained previously in the discussion of the limitations of the process costing of broilers, a meaningful figure for the rate of feed conversion can well be applied by using the tables for weekly feed consumption.

Thirdly, the inventories of 'broilers growing' are assumed to be single at a given time. This also may not be true because the longer the rearing period and the more frequent the ~~six~~ chick purchases, the higher will be the number of broilers growing inventories. Let us suppose that the farm buys chicks every two weeks and grows them for twelve weeks. Under this assumption at a given moment the farm will have broilers growing inventories with the following ages of birds :

From	1	to	15	days,
from	16	to	30	"
from	31	to	45	"
from	46	to	60	"
from	61	to	75	"
from	76	to	90	"

This simple analysis shows that there will be six different broilers growing inventories each having a different staga of completion. One way of manipulating such a situation is to create new accounts for each class of broilers. Another way that fits the needs of those farmers who prefer expediency, is to collect the six classes of broilers in one account by computing the stages of completion and adding them up.

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