THE APPLICATION OF CUMULATIVE PRIME COST ACCOUNT AT DAIRY FARMS

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Abstract

When performing twin product cost account the problem arise how the costs should be allocated amongst products, i.e. what ratio and what methods should be applied. Accentuating or cumulative cost accounting allows, in case of twin products as well, that only those costs would debit the product concerned for which they have actually incurred Groups were formed from the costs of the dairy depending on what connections they have with some specific products. In version I. the cost of insemination as a separate expense debited only the calf, while in version II. it was allocated as a mutual cost. During the development of the specific accounting varieties, we have tried to find an indicator that expresses the utilization ratios. Metabolisable energy takes into consideration not only the needs to be included in the product but the those of the biological processes as well. We were striving to develop solutions that follow biological process as closely as possible.

Key words: cost-accounting, twin product, divisor calculation, equivalence, cumulative accounting, cost allocation

INTRODUCTION

During the production process at dairies two main products are produced which are characterised by the fact that they are separated from each other at a certain stage of the production process, and two or more economically similar products are produced. The production process of twin products are different in terms of production time and their production is completed by different technological procedures. The twin products of dairy farms are milk and calf. Two different methods of establishing prime cost are applicable.

At equivalence divisor calculation first the different kinds of products are converted to the main product. During conversion the most important product of the industry, the so called basic product is taken into account. The prime cost of the basic product is established by simple divisor calculation. The prime cost of the twin product is gained by multiplying with the equivalence number. Establishing the equivalence number is a highly important task since the actual prime cost could be approximated the most precisely if the equivalence number approximates the actual rate of the costs related to a specific product (György, 1957). In the ’50s and ’60s the equivalence numbers used for dividing the total cost of the industry between the main, twin, and by-products were created by the internal value of the products (Gönczi, 1959; Németi, 1963; Dobos et. al. 1965; Csete et al. 1974). In the present practice, according to the principles related to the decree 50/1979. (XII. 15.) by the Ministry of Finance regarding the order of agricultural products and services, prime cost is established by equivalence-number divisor calculation. According to the equivalence number determined by the decree, 1 kg live calf mass should be considered as equivalent with 8 litres of milk. The advantage of the method was determined in the fact that the conversion numbers of constant nature exclude the changing effect of the economic factors. Its disadvantage is that it is unable to express the appropriation rates of the costs..

Rate divisor calculation was applied when no equivalence numbers were available. In this case standards based on the value rates of the individual products, i.e. design, settlement or sales price, were applied. The biggest failure of this procedure was that, due to price policy considerations, the appropriation costs did not meet the price (value) rates here either. (Fekete-Rácz, 1962). This method of calculation did not provide exact prime cost, still it was frequently used, due to its simplicity. From 1963 onward, according to the practice applied in the then GDR, calves and milk were expressed in main product quantities by means of grain unit rates (Kovács, 1962; Németi-Kelemen, 1962).

A complex way of divisor calculation is cumulative account. During production the specific main products require separate work processes and have separate costs accordingly. During the calculation any costs that do not debit all the products are separated. The remaining amount will be allocated between products then the prime cost of the product debited is adjusted by extra cost; this kind of extra cost is in the dairy are the treatment of the milking house and the milk, which can be connected directly to milk production

The aim of the study is to elaborate an accounting method which, by taking biological processes into consideration, will approximate the ration of costs occur more precisely.

MATERIAL AND METHOD

For the model examined the data related to cost and prime cost account (year 2008) of a 1,000-headcount dairy farm of a Trans-Danubian agricultural company were used. In this present study the method of cumulative accounting were used. We have elaborated two versions for the accounting, and the results yielded were compared by the equivalence number divisor calculations used even today. Accounting version I.: Cumulative accounting where the cost of insemination is considered the extra cost of the calf. Accounting version II.: Cumulative accounting where the cost of insemination is considered the mutual cost of the two products.

We have started from all the costs accounted for the dairy farm as the bearer of the expenses. The company treats manure as a by-product and its value calculated at accounting price is reduced from the total costs, and this is how the total costs of the main product is calculated. In case of version I we have created four cost groups from the cost reduced by the value of the by-product, while in case of version II we created three cost groups.

The costs of the dairy farm were grouped according to what relation they have with the specific products. The extra cost of milk production includes the devaluation and the operating costs of the milking house including the wages and the relevant contributions of the people working there and the cost of milk's quality tests. The extra cost of insemination was considered the extra cost of the calf only in the I. st accounting version. In version II the cost of insemination was included in the mutual costs of calf and milk, since successful insemination pregnancy the delivery of the calf are inevitable preconditions of milk production. Thus the cost of insemination is inevitable for both products. The third group includes the value of bought and self-produced feed used up, which was divided between the twin-products according to the metabolisable energy needs necessary for production. When dividing the feed products we were trying to find an indicator that is suitable for describing the ratios of feed use, this is why we applied the rate established according to metabolisable energy needs necessary for production. Milk was considered the base product. and calf yield was converted to the base product according to the energy equivalent. Then the cost falling on milk was established by simple divisor calculation which was multiplied by the equivalence number yielding the cost falling on the calf.

Table 1

Net and metabolisable energy needs of the products of the milk producing dairy farm

Description	Net energy needs	Metabolisable energy needs
Milk production	3,18 MJ/l	5,132 MJ/l
Calf production	6,57 MJ/kg	40,32 MJ/kg

Source: according to Schmidt, et al. (2000).

As it is clearly demonstrated by table 1, considering the metabolisble energy needs, 1 kg of calf is equivalent with 7,856 litres of milk. (40,32 : 5,132 = 7,856)

The fourth cost group includes the costs of other materials and additional services used, the wages of animal handlers, their contributions, the devaluation of cows, the overall cost of auxiliary and main industries which have been divided between the products without weighting.

During model calculation the usual practice applied by the company were taken into consideration for the livestock changing of specific age groups. Accordingly, livestock was divided into five age groups. Animals stay in the suckling calf stock only for five days, in the beestings period. The accounting versions constituting the base of the examinations directly affected the calculation of this group. Here neither cost nor mass gain were accounted. Drinking calves will include only the ones that are going to be used for breeding. At the age of 6 months, after reaching the body mass of 200 kg, they get into the pup category where they stay until the first calving or else until the age of 25 months. From the pup stock the specimens inadequate for insemination get into the vealer group which constitutes the 1.2 % of the age group. Vealer stock includes male calves, females that are inadequate for further breeding, and rejected cows.

Every year 33% of the cows fall out of production at the company due to either rejection or death. The replacement of the breeding stock is provided from the dairy's own stock. Death toll was planned according to the factual data provided by the company. We calculated with 0% death rate at suckling calves, 5.6% at drinking calves, an 3,8 % at pups.

RESULTS AND DISCUSSION

Table 2. shows the distribution of the cost groups developed during the application of the accounting versions examined.

Table 2

The ratio of the specific cost groups within the costs of the dairy farm (%)

Cost groups	Version I	Version II
Extra cost of milk	14.7	14.7
Extra cost of calf	1.1	-
Feed cost	50.9	50.9
Other costs	33.3	34.4
Total	100	100

Source: Our own calculations

While applying the traditional equivalence number calculation no cost groups were created thus they do not appear separately in the table. During the calculation we chose total costs decreased by the by-products as the starting point, then we divided it between the two products by the help of the rate number. Both accounting versions are characterized by the fact that more than half of the total cost is constituted by the value of own-produced feed and one third by other costs. In version I. the cost of insemination was considered as the extra cost of the calf and constituted only the 1.1 % of the total costs. This cost factor was not accounted for the milk, only for the calf. In accounting version II. we have developed three cost groups. The cost of insemination got into the „other costs", and according to this it was accounted for both products, without weighting.

The three kinds of procedures applied during the distribution of the costs decreased by the by-products, the three procedures applied will directly influence the prime cost of milk and suckling cows. It will affect the other groups only as a consequence of ageing.

Table 3

Changing of prime cost of milk and suckling cow according to the specific accounting versions (HUF/kg)

	year 1			year 2			year 3		
Description	Trad.	Vers. I	Vers. II	Trad.	Vers. I	Vers. II	Trad.	Vers. I	Vers. II
Milk	66.6	66.8	67.5	67,0	67.1	67.8	67.3	67.5	68.2
Suckling calf	532.9	491.3	290.1	535.7	491.7	290.5	538.6	492.1	290.9
Milk/Calf	1:8	1:7.3	1:4.3	1:8	1:7.3	1:4.3	1:8	1:7.3	1:4.3

Source: Own calculations

Table 3. shows the prime costs established during the application of the specific accounting versions. Both new accounting versions are characterised by the fact that the prime cost of milk increases while some decrease can be seen in the prime cost of suckling cow. Compared to the traditional accounting the biggest difference is seen in the prime cost of milk when the accounting version II. was applied. The difference between the traditional and version I. is 0.23 %, while between the traditional and the version II. a difference of 1.3 % can be seen. The most remarkable difference can be seen in case of the prime cost of the suckling cow. When applying version I. the decrease of prime cost is 7.8 %, while at the accounting version II. the same value is as high as 44.4 %. The cost of insemination represented barely 1 % within the costs of the dairy farm (see table 2.) still when accounted as mutual cost for both products it had a considerable impact on the prime cost of the suckling cow. Due to the equivalence number applied at the traditional accounting the ration of the two prime cost is 1:8. In version I. this value is 1:7.3, while in case of the version II. it is 1:4.3, since here the prime cost of the suckling cow is 55.6 % of the value yielded by the traditional accounting. Within the specific accounting variations a minimal rise of the prime costs can be seen year by year. In the model applied the value of the first year's opening livestock equals with the value of the livestock of the company. In the first year the devaluation calculated according to the opening livestock was included in the costs of the dairy farm. In the second year one third of the livestock is the livestock with higher prime cost calculated by the specific accounting version sin the previous year. The rejected animals will be replaced by more valuable animals that have, in turn, higher devaluation as well. In the third year, in the model applied, already two thirds of the livestock, then in the fourth year the whole of the livestock consists of more valuable animals. In accordance with this, the cost of the dairy farm, due to the higher devaluation, will grow year by year, then, after the total exchange of the livestock, the impact the accounting made on the devaluation will vanish. The costs of the dairy farm, except for the devaluation of the cows, were considered equal, so the impact the accounting made on devaluation could be seen as well.

Table 4

The ratio of the specific cost groups within the prime cost (%)

Cost groups	Version I		Version II	
	Milk	Calf	Milk	Calf
Extra cost	15.1	41.1	14.9	-
Feed cost	50.8	54.3	50.3	91.9
Other costs	34.0	4.6	34.8	8.1
Total	100	100	100	100

Source: Own calculations

Table 4. shows the what ratio the specific cost groups represent in the prime cost of the twin products. The constitution of prime cost of milk is similar to the ratio of the cost groups within the total costs, and this could not be influenced considerably even by the

specific accounting versions. For both versions feed cost is a decisive factor which accounted for more than half of the total costs; in version II. this value is less by 0.5 %. The ration of other cost is somewhat more than one third. In case of accounting version II. the partial ratio of other costs will increase at the expense of feed an extra costs. The explanation for this lays in the fact that the relocation of the cost of insemination increased the ration of mutual costs within the total costs. The constitution of the prime cost of calf is significantly different from the ration of cost groups within the total costs. According to the accounting version I. the cost of insemination will runs to 41.1 % of the prime cost of calf, while feed cost is about 50%, and the ratio of mutual cost decreases to 4.6 % in version one and to 8.1 % in version II. according to version II. where the cost of insemination was taken into account for both products as a mutual cost, the prime cost of the calf decreased almost by 44.4 %,and feed cost has become decisive with its ratio of 91.9 %.

Table 5

The distribution of insemination cost between milk and the calf (%)

Description	year 1		year 2		year 3	
	Milk	Calf	Milk	Calf	Milk	Calf
Accounting I	-	100	-	100	-	100
Accounting II	99.6	0.4	99.7	0.3	99.6	0.4

Source: own calculations

In the model provided we have taken account 8.427.415 litres of milk and 30.400 kg calf as the yield of the dairy farm. Table 5. demonstrates that the suckling calf prime cost provided by version II. which is low as compared to the other two accounting versions, is the consequences of the fact that insemination cost was included in the cost of milk.
Of course, due to ageing, the cost of suckling cow influences the live mass prime costs of all age groups.

Table 6

Changing of prime cost of age groups according to the specific accounting version (HUF/kg)

	year 1			year 2			year 3		
Age groups	1:8	Vers. I	Vers. II	1:8	Vers. I	Vers. II	1:8	Vers. I	Vers. II
Suckling calves	532.3	491.2	292.8	535.6	491.7	290.5	538.6	492.1	290.9
Drinking calves	492.4	487.1	461.7	511.6	504.7	473.0	516.5	508.9	475.7
Pups	277.4	276.6	272.6	283.1	281.6	274.7	286.7	284.8	276.0
Vealers	185.7	183.1	170.4	182.2	179.3	165.7	182.0	179.1	165.4

Source: Own calculations

The prime cost of the specific age groups evolves from the value of stock increase and the production costs of the year concerned. The prime costs of the drinking and pup stocks are influenced by only the prime costs yielded by the previous age group. The live-mass prime cost of vealers, however, will affect the prime costs of several age groups: the suckling calves by means of reclassified bull calves, the pups inadequate for breeding plus the rejected cows. At the company used for our database, suckling calves getting into vealer stock are sold when reaching the weight of 140 kg, while rejected cows are processed for beef when they weight 560 kg, thus this model followed this stock development as well.

In accounting version I. the prime cost of suckling calves is 8.3% lower as compared to the original accounting. Due to the reclassified calves the prime cost of drinking cows will be moderated only by 1.07%. The animals stay in this until the age of ½ year, resulting in a higher opening stock which, in turn, will blunt the prime-cost-decreasing effect of reclassified calves. In case of pup stock the 0.29% prime cost moderation is attributed to the effect of opening stock and drinking calf stock. In case of vealers, the decrease of prime cost is 1,4 %. In this age group the effect of reclassified suckling calves with low prime cost is more expressed then those of the opening stock's, the reclassified drinking calves, and the rejected cows.

In case of the accounting version II. the prime cost of suckling cow age group is 55% of the value calculated by traditional accounting. A higher rate of prime cost decrease can be observed in the higher age groups as well, as compared to the accounting version I.. Namely, 6,2 % at drinking calves; 1,7 % at the pups, and 8,2 % at the vealers. When taking the higher age groups into consideration, a more expressed prime cost moderation can be observed in case of the vealers, due to the ageing of the suckling calves again.

CONCLUSION

The results provided by the model show that combining cumulative cost account with energy equivalence will move the costs from the calf towards the milk. The cost reduction of a suckling calf will affect the live-mass cost of all age groups due to ageing. The moderation of suckling calf cost depend on whether the cost of insemination will be accounted for the cost of the calf or for both products as a mutual cost. In case it debits only the calf it will constitute a considerable part of the cost, so the ratio of cost reduction as compared to the traditional calculation will be far smaller. In case the cost of insemination is debited to both products, due to the magnitude difference seen in the two kinds of yields, barley the 0.4 % of the insemination cost will be included in the live-mass cost of the calf, the remaining 99.6 % will debit milk.

We have established that by applying cumulative accounting the cost of calf decreased while the cost of milk increased. Cost flow can be observed between the two products. The extent of cost rearrangement depends on what is considered to be a common and what is seen as a separate cost.

The accounting of milking house as a cost place would allow the collection of costs related to milk production in order to involve them only in the prime cost of milk.

REFERENCES

1. Irányelvek az 50/1979. (XII. 15.) PM számú a mezőgazdasági termékek és szolgáltatások önköltségszámításának rendjéről szóló rendelethez.134-138. pp
2. Csete, L – Gönczi, I –Kádár, I–Vadász, L (1974): Mezőgazdasági vállalatok és üzemek gazdaságtana. Közgazdasági és Jogi Könyvkiadó, Budapest 561-564. pp
3. Dobos, K –Jankó, J–, Tóth, M – Vágsellyei, I (1965): Mezőgazdasági üzemtan. Mezőgazdasági Kiadó, Budapest 32-33 pp
4. Fekete, F. – Rácz, L. (1962.): A nemzetközileg összehasonlítható mezőgazdasági önköltség-mutatók kiszámításának módszere és első eredményei. Magyar Tudományos Akadémia Agrárgazdasági Kutató Intézete Budapest 131. p
5. Gönczi, I (1959.): Mezőgazdasági üzemtan. Jegyzet. Mezőgazdasági Akadémia, Debrecen 131. p
6. György, E (szerk. 1957.): Mezőgazdasági önköltségszámítás. Közgazdasági és Jogi Könyvkiadó, Budapest 22-26. pp
7. Kovács, L (1962.): A költségszámítás néhány problémája a termelőszövetkezetekben. Magyar Mezőgazdaság 17. sz.
8. Németi, L-né (1963.): A termelőszövetkezeti önköltségszámítás módszereinek összehasonlítása. A Magyar Tudományos Akadémia Agrárgazdasági Kutató Intézete Közleményei 4. szám, Budapest 52-53. pp
9. Németi, L-né – Kelemen, A (1962.): A mezőgazdasági önköltségszámítás és a gépi könyvelés tanulmányozása a Német Demokratikus Köztársaságban. A Magyar Tudományos Akadémia Agrárgazdasági Kutató Intézete 35. szám, Budapest 29. p
10. Schmidt, J– Várhegyiné – Várhegyi, J– Túriné /2000./: A kérődzők takarmányainak energia és fehérjeértékelése. Mezőgazda Kiadó, Budapest 15-16; 119-120. pp

***2000. évi C törvény a számvitelről.