Information Technology and Danish Agriculture

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Abstract. During the second half of the 20th century Danish agriculture has experienced large-scale changes. The agricultural profession has been highly mechanized and Denmark has experienced an extensive movement of people from the rural areas to the cities. The cultivated area and the number of farms have been reduced and so has the number of employees, but the grand total of agricultural production has risen. A development which has been highly supported by information technology starting with punched cards in the 1950s and later resulting in a very efficient Danish agricultural sector, being the largest export sector in Denmark.

1 Introduction

This is the story about how nearly 200,000 independent Danish farmers as early as the 1950s began to take advantage of the new technological opportunities represented by punched cards.

The development began in 1954 in the dairy sector, and a few years later the slaughterhouse sector followed suit. In March 1962 the dairies and slaughterhouses established a company called Mejeriernes og Slagteriernes Hulkortcentraler with the main office in Aarhus and offices in Odense and Roskilde. After being centralized in 1973 and located in Aarhus the name changed to LEC - Landbrugets EDB-Center (Danish Agricultural EDP-Center).

Over the next 30–40 years LEC played an important role in the development of the Danish agricultural sector increasing the productivity and profitability of Danish farming making the agricultural sector the largest export sector in Denmark.

With the establishment of LEC, Danish farmers got an EDP service centre, which made it possible for them - in close co-operation with dairies, slaughterhouses and feedstuff businesses - to take advantage of large-scale operations supporting efficient utilization of the expensive machinery. Furthermore it was possible to jointly develop EDP programs and to continue further development based on common experiences.

Over the years LEC became one of the largest EDP service centres in Denmark, indirectly owned by all farmers who belonged to a co-operative slaughterhouse or dairy or were members of a professional society. It was extraordinary that an entire business sector in this way was able to co-operate in order to take advantage of the technological progress.

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2 Danish Agriculture

2.1 The Cooperative Movement

Denmark has always been an agricultural country. The primary production originally consisted of a huge number of small family owned units. A great deal of Denmark's export has always been agricultural products. Until the 1870s corn was Denmark's most important export article and Great Britain was the most important export market. Gradually corn from overseas countries outmatched the Danish export, and therefore Danish agriculture changed from production of vegetables to animal production with focus on export of butter and bacon to Great Britain.

To ensure an industrial production of high quality products the Danish farmers started the cooperative movement – an organizational form which was a democratic alternative to the capitalistic organized business life. The farmers got common ownership of the production companies in a democratic community. Each farmer had one and only one vote at general meetings, regardless of the size of their livestock.

In 1882 Hjedding Andelsmejeri was established as the first cooperative dairy, and already in 1890 about 700 cooperative dairies were established. The first cooperative slaughterhouse was established in 1887. The following years a number of wholesale societies and export associations were founded as cooperative enterprises. A number of agricultural unions were founded in order to help the members with agricultural and accounting related problems.

Today agriculture and food are Denmark's largest industry, employing around 150,000 people and exporting agricultural products, food and equipment at an annual value of around € 15 billion.

2.2 Organizational Structure in Danish Agriculture

The medium-sized and large farm units were organized in a number of local associations, which together formed the Federation of Danish Farmers' Union. The small farm units were correspondingly organized in local associations, which together formed Danish Smallholders' Union. In the 1950s about 136,000 farmers were members of Federation of Danish Farmers' Union and about 103,000 were members of Danish Smallholders' Union.

As for the farm products the farmers were members of cooperative societies representing the individual products such as butter, cheese, bacon, poultry, potatoes, sugar and more. These businesses were all members of The Federation of Danish Cooperative Societies.

Federation of Danish Farmers' Union, Danish Smallholders' Union and The Federation of Danish Cooperative Societies together formed The Agricultural Council, which has been the common mouthpiece for the agricultural sector in matters related to the government, the authorities and the surrounding world.

In 2003 Federation of Danish Farmers' Union and Danish Smallholders' Union merged into Danish Agriculture. In 2009 The Danish Agriculture & Food Council was

established as a result of a merger of the following agricultural organizations: Danish Agriculture, the Danish Bacon and Meat Council, the Danish Agricultural Council, the Danish Dairy Board and Danish Pig Production. The Danish Agriculture & Food Council represents the farming and food industries of Denmark including businesses, trade and farmers' associations.

2.3 Changes in Structure

From 1950 till 2000 Danish agriculture has experienced large-scale changes. The agricultural profession has been highly mechanized, and Denmark has experienced an extensive movement of people from the rural areas to the cities. The cultivated area has been reduced about 10 % from 3,094,000 hectare in 1960 to 2,770,000 hectare in 1991. The number of farms has been reduced from 196,100 in 1960 to 74,900 in 1991, and in the same period the average size has increased from 16 to 37 hectare. Especially the number of farm with less than 20 hectare has been reduced, and the number of farms with more than 50 hectares has risen from 6,300 in 1960 to 16,100 in 1991. This development is continuing.

As horses gradually were replaced by tractors the number of horses has been reduced from 171,000 in 1960 to 32,000 in 1991. The horses are now mostly used for hobby and sport. The number of cattle has been reduced from 3,397,000 in 1960 to 2,222,000 in 1991, whereas the number of pigs in the same period has increased from 6,147,000 to 9,783,000.

The number of full-time employees in the primary agricultural sector has declined from about 300,000 in 1960 to about 95,000 in 1991.

The pig production is of great importance to the Danish export. The number of slaughter hogs has increased from 8,067,000 in 1961 to 11,600,000 in 1972, 13,990,000 in 1982 and 20,190,000 in 1997. The meat production increased from about 650 mill. kg in 1960 to about 1,250 mill. kg in 1990 (Table 1).

Table 1. Number of pig suppliers, divided on pig production per year

Year	Number of pig suppliers				
	≤500 pigs	501–2000 pigs	2001–5000 pigs	≥5001 pigs	Total
1961	153,608	528	5	–	154,141
1972	87,489	2,830	54	–	90,802
1982	51,385	6,917	602	32	58,936
1992	22,433	6,797	1,858	243	31,331
1997	12,446	5,202	2,398	519	20,565

The number of farmers with pig production has been reduced drastically with 86.6 % from 1961 till 1997, and in the same period the average production per farm has increased from 52 to 893 pigs.

As for cattle the total number of cattle has declined drastically from 3,398,000 in 1960 to 2,181,000 in 1992, and the number of milk cows has been halved from 1,440,000 to 720,000. The number of milk cattle herds has been reduced form 171,000 in 1959 to 20,700 in 1991. The average of cows per herd has thus increased from about 9 in 1960 to about 35 in 1992, and especially the number of herds with more than 49 cows has increased. In 1982 there were more than 49 cows in 12.9 % of the dairy herds. In 1991 this percentage had increased to 23.0 %.

The milk production has declined from about 5,000 mill. kg in 1960 to about 4,600 mill. kg in 1992. In the beginning of this period the greater part of the milk production was used for butter production and a smaller part for cheese production. In 1992 the same part of the milk production was used for butter production, respectively cheese production, and a production of milk powder and other canned milk products was starting up (Table 2).

Table 2. Changes in production of butter, cheese, and milk powder

Year	Butter production mill. kg	Cheese production mill. kg	Milk powder and other preserved milk products mill. kg
1960	166.7	113.4	64.0
1991	70.5	286.7	138.8

Apart from milk, meat and cultivation of plants Danish agriculture also produces for instance poultry, eggs, furred animals, potatoes and potato starch.

In other words – during the second half of the 20th century the Danish agricultural sector has experienced a remarkable development through mechanization and efficient utilization of the technological achievements. In spite of the fact that the number of people employed in the agricultural sector has been reduced by about 65 % the grand total of agricultural production has risen and the export of agricultural products still accounts for a considerable part of the total Danish export, even though the share has been reduced from about 50 % in 1960 to about 20 % in 1990.

3 LEC - Danish Agricultural EDP-Center

3.1 Establishment of LEC

In 1954 the punched card equipment was introduced into the Data Processing Department of the Federation of Danish Dairy Organizations located in Aarhus. In 1958 the equipment was introduced in Data Processing Centers serving the slaughterhouses in Aarhus, Odense and Roskilde.

Developments led to increasing co-operation between these organizations, and in March 1962 the dairies and slaughterhouses established a company called Mejeriernes og Slagteriernes Hulkortcentraler (The Dairies and Slaughterhouses' Punchcard Centre) – later known as LEC. The founders were:

- Federation of Danish Dairy Organizations
- Federation of Danish Co-operative Bacon Factories.

LEC was established in order to use data processing to solve data handling problems related to the Danish agricultural sector and to supply advisory service assistance to this sector. The vision was:

- Common efficient utilization of the very expensive machinery
- Establishing a common EDP-knowledge, which could be an advantage for the whole agricultural sector
- Developing standard systems for different groups of users as well as systems for individual users
- Establishing data bases for farmers, companies and organizations.

LEC was run on a non-profit basis. All profit was invested in the development of new and better data processing systems, services and education.

The aim was to be the one EDP-supplier supporting the agricultural sector in a broad sense, and therefore the original ownership of LEC was extended. From January 1971 the owners of LEC were:

- Federation of Danish Dairy Organizations.
- Federation of Danish Co-operative Bacon Factories
- Danish Farmers' Union
- Danish Smallholders' Union
- The Agricultural Council.

In this way LEC was owned indirectly by every farmer who belonged to a cooperative slaughterhouse or dairy or was a member of a professional society.

3.2 The Structure and the Staff of LEC

LEC was divided into four departments:

- Advisory department
- Systems department

Fig. 1. Danish Agricultural EDP-Center, Bytoften, 8240 Risskov, Denmark

- Production department
- Administration.

The Advisory department took care of sales, development and service. The staff acted as a link between LEC's users and LEC. The department was divided into four sections, and each section was divided into groups related to different user groups. The Systems department included systems design and programming. The Production department was responsible for running LEC's computers. It received input material from customers, prepared data for the computer, checked and controlled the output, packed and dispatched the output to the customers (Fig. 1).

In March 1962 the number of employees at LEC was 49, and the number was growing fast in the following years reaching 695 in 1988 (Fig. 2).

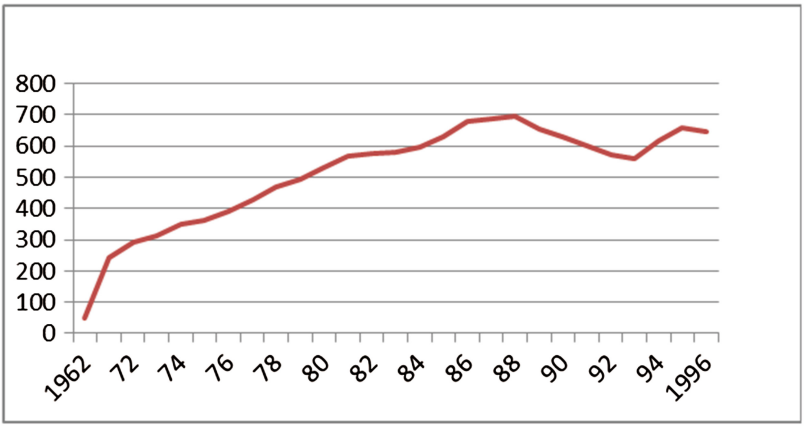

Fig. 2. Number of employees at LEC 1962 – 1996

3.3 The Computers at LEC

From the beginning LEC was focusing on the efficient utilization of very expensive machinery and on taking advantage of the very fast development of new technologies. LEC's rapid growth due to the rising need for data processing led to a continuous updating of the computing equipment, both in hardware (processors, peripherals and terminals) and in software. LEC always replaced processors concurrently with the development of new technology. Installation of processors over the years can be seen in Table 3.

In 1988 an IBM 3090/600E was installed at LEC and later an IBM 3090/330 J and an IBM 3090/600E.

3.4 The Technological Development

In Denmark LEC tried to be in front when it came to utilizing new technologies as for instance OCR (Optical Character Recognition). The growing number of data to be

Table 3. Computer installations and capacities.

Year of procurement	Type	Number	Transactions per second	Memory size in bytes
1961/1962	IBM 1401	4	5	4 – 16 KB
1966/1968	IBM 360/30	2	10	16–64 KB
1970/1971	IBM 360/50	2	40	512 KB
1971	IBM 370/155	1	800	1 MB
1972	IBM 360/145	1	400	512 KB
1973/1974	IBM 370/158	2	1,000,000	2 MB
1977	IBM 370/158-3	2	1,100,000	1,5–2,0 MB
1978	IBM 3033/U	1	5,000,000	4–6 MB
1981	IBM 3033/U	1	5,000,000	4–6 MB
1981	NAS AS/9000	1	7,500,000	16–24 MB
1982	IBM 3081/D16	1	10,100,000	16 MB
1983	IBM 3081/K24	1	15,400,000	24 MB
1984	IBM 3084/Q48	1	25,000,000	48 MB
1985	IBM 3084/Q64	1	25,000,000	64 MB
1986 (February)	IBM 3090/200	1	28,000,000	64 MB
1986 (November)	IBM 3090/400	1	50,500,000	128 MB

recorded in punched cards required too much manpower, so in 1967 LEC began to make use of OCR. The two IBM 1287 Optical Readers, which were installed, made it possible to record data from handwritten as well as printed forms. At many advisory centres, information from the cash book was entered by an operator using a special typewriter, which printed a tally toll with machine-readable OCR numbers and symbols. A large part of all LEC's input transactions was in OCR forms until the 1970's, where terminals/display stations placed at customers' location took over as data recording medium.

The telecommunication development began in the late 1960s, and in 1971 LEC installed terminals at two customer locations. At this time the transmission speed was only 1200 bps. The number of installed terminals at customer locations increased very fast, and in 1989 more than 28,000 terminals across Denmark were connected to LEC's computers. Also a great number of terminals placed at customer locations abroad were connected to LEC's computers.

As the computer systems handled a still broader span of business administration, the number of reports and statistics to be printed increased rapidly. In 1979 LEC installed IBM 3800 Printing Subsystem, printing up to 20,000 lines per minute. Very soon three IBM 3800 Printing Subsystems were installed at LEC, and in 1993 LEC printed 130 million pages.

The output was distributed to farmers and companies, but a lot of copies were filed and took up many running metres in the archives, where it could be difficult and time consuming to find the information needed. To reduce the need for archive space and to

make data retrieval easier, LEC installed equipment for producing microfiche in 1975. LEC produced a great number of microfiche every year. For instance, in 1983 LEC produced 110,000 originals and 275,000 copies of microfiche, which corresponded with around 80 million pages of paper. In the 1980s the use of microfiche was reduced, and it gradually ended as the prices for online storage capacity with direct access from terminals became cheaper.

As the volume of electronic data increased, the need for being able to quickly and efficiently store and retrieve data also increased. A tape robot was installed at LEC, and from a customer's data screen it was possible in a few minutes to retrieve data.

3.5 Farmer Terminal

During the 1970s most of the Danish dairies, slaughterhouses, feedstuff businesses and advisory centres took advantage of telecommunication services provided by LEC using a great number of terminals connected to LEC's computers. Around 1980 LEC started a project to develop a farmer terminal, which was a piece of hardware based on the idea of bringing EDP to the farmers' own desks. A special farmer terminal was developed and a small number was produced, but without much success. The development process had been overtaken by the very fast PC development. However, LEC's attempt to develop a special farmer terminal later proved valuable, as it prepared the Danish farmers for a future strongly influenced by new information technology, which has let to new opportunities to make farm production more efficient. And in the year 2000 almost every farmer owned a PC.

3.6 Outside Agriculture

In the late 1960s LEC experienced a demand for EDP service from customers outside the agricultural sector. In 1972 LEC decided to establish a department to expand LEC's business with these customers. At that time LEC almost enjoyed a monopoly of EDB services to the agricultural sector. The new department delivered EDP services on the same conditions to customers both inside and outside the agricultural sector. LEC wanted to prove its competitive competences. The department experienced a positive development and a fast increasing turnover to about 25 % of LEC's total turnover in 1986.

3.7 LEC India

In the early 1990s programmers and systems developers was a scarce resource in Denmark, with growing salaries as a consequence. To get enough and cheaper manpower LEC established a subsidiary in Bangalore (Bangaluru) in India in 1994. In March 1995 five highly skilled Indian systems developers began working at LEC India, and at the end of 1995 LEC India employed 44.

3.8 Turnover

LEC's turnover was growing fast as can be seen below (DKR):

1962:	2,442,000	1986:	263,700,000
1971:	23,869,000	1991:	428,213,000
1976:	60,180,000	1996:	598,209,000
1981:	134,965,000	1998:	746,900,000

3.9 LEC for Sale

In the 1990's the information technology was widespread, and the PCs became cheaper to buy. The use of computer power changed from primarily being used for administrative purposes to handling of information in a broader sense. EDP had changed to IT, Information Technology. The merging of dairies, slaughterhouses, feedstuff businesses and advisory services resulted in very big business units such as Arla Foods, Danish Crown, DLG and Danish Agricultural Advisory Service. Each of these units was big enough to have their own IT department, and the need for a common utilization of the information technology was gradually reduced. In April 1999 LEC was sold to Maersk Data, and the agricultural owners of LEC realized a fairly good accumulated capital.

4 Systems Development at LEC

From the beginning in 1962 LEC's primary task was to efficiently utilize the very expensive electronic data processing equipment such as IBM 1401, which was installed to substitute the punched card machinery. The very fast development of still more powerful equipment increased the need for development of new systems to utilize the new opportunities. LEC played an important part in this development of systems to be used by both farmers, dairies, slaughterhouses, feedstuff businesses and advisory centres.

The employees at LEC possessed the technological skills for developing computer systems, and the systems was designed in close co-operation with agronomists at the Knowledge Centre for Agriculture as well as representative from customers such as dairies, slaughterhouses, feedstuff businesses and so on. These representatives took care of the users requests for facilities in the systems to be developed.

Many different systems have been developed at LEC a few of which are briefly described below. They are all intended to make the Danish farming industry more efficient.

4.1 Milk Recording System

Milk recording started in Denmark in 1895 when the first recording society in the world was launched. The main purpose of milk recording has always been to collect data that could be used to improve cattle productivity. As more and more farmers joined the

recording societies, an even greater amount of data had to be handled systematically. The computerization, which started in the 1950s, resulted in a still more sophisticated utilization of the data.

The number of milk recorded herds reached its peak in 1957 with almost 80,000 herds with an average size of about 11 cows. Over the following 40 years the number of herds dropped to about 12,000. In this period the number of milk recorded cows dropped from approx. 875,000 to approx. 600,000 in 1995. Thus the average size of a Danish milk cattle herd increased to 51 cows. In the same period the productivity increased considerably. Milk production per cow rose from 4,000 kg to almost 7,000 kg and fat production from 170 kg to 310 kg.

The basic purpose of a milk recording system was to monitor the quantity and quality of each cow's milk in order to provide information for allocating and controlling each cow's feed to make the production of milk as economical as possible. Furthermore the system recorded details of slaughtering, calving and lactation in order to provide accurate information to the farmer on how efficiently he was running his herd.

A technician visited each herd once a month to take a sample of each cow's milk. He recorded the quantity and took the samples to a milk testing laboratory for testing for fat and protein. All the recorded data were sent to LEC. In the beginning data were converted to punched cards. Later on, the use of OCR forms reduced the cost of data collection. With more than 700,000 cows to be controlled it resulted in around 7,000,000 fat and protein analyses every year. All the data were accumulated at LEC, and in fact more information was accumulated for each cow than the tax authority accumulated for each tax payer (Fig. 3).

Fig. 3. A cartoon from Jyllands-Posten, December 3 1983

About 60 reports were produced by the milk recording system intended for herd owners and The National Committee, reports such as Herd report, Cow report, List of young cattle, Annual herd statement and Herdbook summary.

The milk recording system also formed the basis for the development of the Cattle Data Base, which today is a huge database of knowledge, including data on milk production, inseminations, matings, pregnancy tests, disease treatment and so on. The Cattle Data Base is used by farmers for breeding, value assessment and production management as well as research and examinations of general matters.

4.2 Feed Planning

It is of vital interest to a farmer to find out how he can improve the efficiency of his herd. As early as in the 1960s LEC developed a feed planning system to calculate the necessary feed to the individual cow based on the recorded milk production and available feed. Over the years the system has continously been developed, providing the farmers with information on planning the feed requirements for the individual cow in order to increase its milk yield, balancing, in monetary terms, between increased milk production and cost of feed. The farmer needs to know how to use the right mix of own feed production and feed bought elsewhere.

LEC's feed planning system was a very complex system based on scientific research. The comprehensive system provided long-term plans for the most economical ways to feed a herd, short-term plans on how to feed a herd or an individual cow over the next period, and monitoring systems to show both the long-term feed/yield relationship and the long-term status of the herd.

4.3 Dairy Cattle Breeding

Milk recording and feed planning are essential to the farmers, but also a well-organized cattle reproduction is important in the long run to give the farmer a better outcome. Bull stations are responsible for selecting suitable bulls, semen, for inseminating cows and evaluating the results of these inseminations. Many doses of semen are kept frozen during the evaluation process, which takes about five years. During this time the bull's first and second generation is studied closely for milk yield, disease, calving problems and other factors. If the results are satisfactory, the decision is taken to use the frozen semen for insemination. LEC's dairy cattle breeding system was among other things handling the recording of the genetic and production results of selective inseminations. It is important to the farmer to know the genetic characteristics of the individual bull in order for him to select the semen for insemination of his cows.

4.4 Pig Production

Pig production in Denmark is quite big, and live pigs, bacon, and pig meat has formed a substantial part of Danish agricultural export. Pig breeding and management of pigs have been of enormous importance to the Danish farming economy. Computer systems

have been developed in cooperation between LEC and the National Committee for Pig Breeding and Production. They have been as important to the pig farmers as the cattle breeding systems have been to the cattle farmers. A lot of information has been accumulated and processed by the computer systems to provide the farmers with essential information, e.g., on how to select the best young sows for further breeding.

LEC's pig production control systems have made it possible to keep a close watch on all aspects of pork production such as economics, breeding, health and feeding. They have played a large part in increasing productivity at the farms. In the 1980's the systems were used by about 5,000 large-scale pig farmers with 300,000 sows.

4.5 Financial Systems for Farmers

The Danish farmers are legally obliged to prepare tax accounts every year. LEC's accounting and budgeting systems were developed in order to handle the accounts of a large part of Danish farmers through a number of local advisory centres. In 1981 about 55,000 farmers were using the systems. Apart from preparing tax accounts the systems' main purpose was to give the farmer information on the efficiency of his total production, comparing this year with the last year's results and comparing the results with the budget. Thus the farmer could optimize his plans for the next period and see what the likely outcome would be.

4.6 Systems for Dairies

In 1959 1,200 dairies all over Denmark received milk from the milk farmers. From 1970 a wave of mergers reduced the number of dairies. The mergers resulted in one large cooperative dairy company (Arla Foods) and a few privately owned dairies. LEC developed systems to take care of different administrative tasks. One task was to manage payments to the farmers for delivering milk to the dairies. Once or twice a month LEC produced supplier settlements for the farmers (up to 45,000 farmers) and transferred the payment for the milk from the dairy to the farmers' bank account. An invoicing system took care of billing the customers for milk, butter, cheese and other dairy products. Finally a system took care of wages and salaries to the staff and employees at the dairies, and an accounting system took care of financial transactions.

4.7 Systems for Slaughterhouses

In 1962 77 slaughterhouses, of which 62 were cooperative, received pigs from the farmers. From 1968 the number was reduced very fast through merging, and in 1972 there were 31 slaughterhouses, of which 27 were cooperative. The mergers continued and resulted in the 1990s in one big cooperative slaughterhouse company (Danish Crown) and a few smaller cooperative and privately owned slaughterhouses. As was the case regarding the dairies LEC developed systems for different purposes. Supplier settlements for the farmers from delivering pigs and transferring the payment to the farmer's bank account, billing the customers for meat products, wages and salaries to the staff and employees, contract management, storage management and accounting.

4.8 Central Register of Farms - CLR

In the 1960s the pig production was increasing quite rapidly. In 1963 the Federation of Danish Co-operative Bacon Factories expected a possible overproduction of pork and therefore the organization wanted to prepare the implementation of a quota system for delivery of pigs to the slaughterhouses. A central register including all farms in Denmark was established as a punched cards register at LEC. Each farm got a unique 7 digits number (CLR-no.) and about 190,000 farms were included in this central register. The quota system for pig delivery was never established, but in 1970 the Danish government decided to introduce a solution which would pay extra money to the farmers who delivered high quality beef and veal. To manage such a solution a register including all farms was needed, and the central register (CLR) had to be updated. About 30,000 farms no longer existed and many farms had got new owners. The CLR register was updated and LEC developed an administrative system to handle the payment of a bonus for delivering high quality beef and veal.

Later the CLR register has played an important role when developing systems to help the individual farmer run his farm efficiently.

5 Conclusion

It strengthened the development of the Danish agricultural sector that the same EDP systems were used across the sector. Furthermore it strengthened the common advisory service that analysis and examinations could be performed based on the uniform databases. The great number of mergers in the sector pursuing large scale economies among dairies, slaughterhouses and feedstuff businesses also benefitted significantly from using the same data processing systems. It was making the merging process easier. LEC thus contributed to the progress of a very efficient Danish agricultural sector and thereby strengthened the sector's competitive power in major export markets.

References

1. Animal Production Management at Landbrugets EDB-Center, 2nd edn. IBM, Denmark, GE 19-6165-1 (1983)
2. 100 år med ydelseskontrol 1895–1995. Landsudvalget for Kvæg, Denmark (1995) ISBN 87-985472-0-8
3. West-Hansen, E.: LEC's 25 års jubilæum. LEC, Risskov (1987)