SUMMARY

In Sweden the agricultural sector is estimated to use approximately 3.7 TWh per year as electricity or as fuel. About 34% of this total is estimated to be used in the production of beef, pork, eggs and milk, including the spreading of manures. There is also some energy used for harvesting ley and cereals as feed, which is not included. Most of the energy is used as electricity (approx 63%). All these estimates are based on a survey done from 1981-1985 by Nilsson & Påhlstorp (1985). Most of the technical equipment is still the same today on farms of equivalent size and production methods. However, herds of pigs and cattle are bigger now, and therefore new equipment is being used.

The purpose of this study was to collect data about energy use on modern farms of a size, and with technical equipment, that could be expected to be in use for the next 10-15 years. This data would then be added to data from Nilsson & Påhlstorp.

The survey was conducted on 16 farms with buildings mainly built during the last 10 years, and which use modern equipment. These plants were all, except one, in the south of Sweden (Skåne, Halland) and the last one 180 km south east of Stockholm. The study was distributed as follows:

- Four complete dairy farms were studied, and another three were chosen that had interesting technical equipments that were not installed on the first four.
- Three farms with pigs were studied. One had FTS-system (Farrowing to slaughter in the same pen), one Farrowing-growing system (Farrowing to approx. 25 kg/11 weeks in the same pen), and one had Fattening pigs (approx. 25-110 kg).
- Two farms with laying hens were studied. One had furnished cages, and the other had laying hens on floors.
- Two broiler houses were studied.
- Four different types of grain dryers were studied: a batch drier, circulating batch drier, continuous drier, and batch-in-bin drier with multiple stirring augers.

For measuring the electricity, registration devices were installed, of the same type that the power companies use. These meters were installed in order to distinguish the feeding, ventilation, light, mucking, and, for some plants, cleaning/disinfection, heating, milking and packing of eggs. When all this was measured there was still some more electricity that was impossible to measure, or to distribute to the right category. This was categorised as miscellaneous. There were also installed meters for estimating the power (W) at one piglet farm, and at two dairy farms.

In milk production, between 930 and 1540 kWh/cow per year was used, (0.125 – 0.203 kWh/l milk). The functions that used most energy were milking and feeding. Together they used 65-75% of total energy. At the farm which used wheel loader and tractor for mixing, TMR energy consumption was higher than on those farms which used electrical engines for mixing.
To produce growing pigs (approx 25 kg), 689 kWh/sow per year was used which means about 28.7 kWh/25 kg pig. During the fattening period (25-110 kg), 20 kWh per pig was used. An estimate of the total energy requirements to produce finishing pigs from birth to 110 kg indicates 48.5 kWh/110 kg pig or 1163 kWh/sow per year, assuming a sow produces 24 piglets per year. This could be compared to the FTS-system, which used 2431 kWh/sow per year. This difference is not completely caused by different breeding system. The causes are more likely to be due to a different kind of building, and therefore to a greater need of energy for lighting, ventilation, and a higher temperature in the farrowing unit. The farm which used less energy also heated the breeding areas with a heat-pump, and another used diesel as fuel. Most energy was used for heating (including the use of heat lamps). If the building for dry sows needs mechanical ventilation and artificial light, then this leads to a greater use of energy.

In production with laying hens in furnished cages, 3.1 kWh/year per hen was needed, and in a system with free hens 5.0 kWh/year per hen was needed. Light and ventilation fans used most energy, but were also the functions that showed the greatest differences between the systems. The difference in energy used for light is most probably due to higher light intensity, and to two extra hours of light each day in the system with free layers.

In broiler production, the largest use of energy is heating (84%), followed by light, 10.7%, and ventilation, 3.6%. The energy needed to produce one broiler (1.5 kg) was measured to approx 0.91 kWh. This value is an average of five batches due to large variations between batches. The use of electricity differed from 6% to 20% between similar houses.

The grain driers, except the batch-in-bin drier, used between 4.2 and 6.1 kWh per 1000 kg of grain during 2005. The batch in bin dryer and the continuous drier used 9.1 - 12 kWh per 1000 kg of grain. Due to different technical standards, the values are not directly comparable, but the data is valid for the separate functions.