Current Use of EM Technology in Germany and Future Prospects

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***Abstract** : Within the frame work of the national economy, agriculture in Germany has a difficult stand. Due to the permanent pressure to rationalize on the one hand and to raise production on the other, nature has come to its limit. We will show the operational and economical benefit of using EM in examples of dairy farms in Germany. The positive results in these farms and first results in grain and vegetable production lead us to the expectation that the propagation of EM in Germany and moreover in Europe will progress dramatically in the next few years.*

Agriculture in the Overall Economic Framework in Germany

In Germany 3% of the working population earns a living in agriculture. With the connected trades and industries more than 15% depend directly on the field of agriculture. Germany spreads on a floor space of 36 million ha. Of this 54% is used agriculturally. 30% are forest, 2% water and 14% is used for housing, roads, industies etc.
440.000 farmers and their families are working in agriculture. Less than half of them, 190.000, draw more than 50% of their income from agriculture. In the average these operations work on 47 ha. 250.000 families work their farms part-time. These farms have an average of 12 ha. Each year approximately 3% of the farms give up their business because the economical prospects for young people are unsatisfactory. Every day 130 ha land were used for housing, roads or industries. One can say that within the whole European community farmers are under severe structural pressure.
Today the average German citizen spends not more than 10% of his/her income on food. Housing, on the other hand, takes ca. 20% of the income. In other countries of the EU, for example in Italy and France, people spend more than 20% on food because traditionally the average citizen in these countries values the quality food higher than people do in Germany. Up to now in Germany it has been difficult to get better prices for food of a higher quality.
Basically because of the structural problems of distribution natural food products are much higher in price, often 100% more expensive than conventional products. Experts estimate that within the next 10 years 10-15% of the population will buy the expensive natural food products. Currently only 3% of the farmers work according to the rules and regulation of organic farming. However, the demand for organically grown products cannot be met because even with imports there is still higher demand than supply. Scandals like the mad cow disease and others have pushed the consumer to demand more food products that have been grown without the use of agricultural chemicals pesticides and antibiotics.

Approach for the Distribution of EM in Germany

Distributors of EM in Germany take this situation as a starting point. Many farmers do not dare to change over to organic farming because they do not trust that prices will stay as high. In addition organic farming still leads to something like 25% less yields - not mentioning the difficulties in the period of transition from conventional to organic farming.

When confronted with EM, farmers often reject it because they do not believe in a “miracle drug”. But when they see that a neigbour is making money by using EM they start to ask questions. This is the reason why we have integrated the economical aspect into our approach of presenting EM to German farmers.

The First German Farmer to Integrate EM into his Operation

In the winter of 1997/8 the first farmer in Germany was convinced to begin integrating EM into his farming. The farm is situated in North-West Germany with an average temperature of 10°C, 850 mm rain distributed more or less evenly through the year, and a good, deep soil. It is an ideal situation for a dairy farm. Feed has to be conserved for ca. 180 days, that is hay or silage (grass and corn), because of cold temperatures in winter.

Even though this farm could earn a good living with 80 ha land and 80 cows plus offspring the farmer and his family were thinking of giving up the farm. The features in the following table shows why this farm was not successful. This example could stand for another 10.000 similar farms in this country.

Table 1. Features for Successful and Unsuccessful Dairy Farms

	Successful	**Unsuccessful**
Costs for veterinarian per cow per year	50 Euro	100 Euro and more
Insemination rate	1.3	1.9 and more
Time between two calwes	less than 390 days	more than 400 days
Health problems after birth in % of births	less than 3	more than 5
Somatic cell count	less than 150.000	more than 200.000

We can find the features for successfully as well as unsuccessfully managing dairy farms which milk more than 7.000 kg/year and manage the feeding well. The outer mark of an unsuccessful farm, however, is extremely foul smelling manure. Successful farms smell okay, unsuccessful farms do not.

The farm in question participated in a group of neighbouring farmers who evaluated their results on the farm on a regular basis in order to find suitable improvements. In this group this farm belonged to the those with the lowest returns.

The stables were already more than 30 years old and needed to be replaced but there was no sufficiant capital to do this. It was clear to the young farmer that continuing like this would have resulted in a slow financial death of the farm. As an alternative he would have had to sell his cattle, lease out the land and become an employee in some other area - like his father when he handed the farm over to him. In this situation he was introduced to EM by Peter and Reinhard Mau.

The next table shows the operational data since the beginning of the integration of EM into the farm over the past years.

Table 2. Development of Dairy Farm* using EM / Operational Data

Data	Operational Years				Compared to Group of Neighbouring Farms
	Without EM	From Feb 98 with EM			
	97/98	**98/99**	**99/00**	**00/01**	***00/01***
Number of cows	80	80	80	100	*89*
Costs for EM/cow in Euro	0	31.25	31.25	31.25	*0*
Milk/cow (sold) kg	7800	7900	8500	8200	*8790*
Milk/cow from ground fodder kg	3300	3650	4028	4090	*3610*
Concentrate feed per cow kg	1,800	1,700	1,789	1,644	*2,072*
kg concentrate feed per kg milk	**0.23**	**0.22**	**0.21**	**0.20**	***0.24***
Somatic cell counts	300000	100000	110000	100000	*180000*
Insemination rate	2.10	1.80	1.20	1.25	*1.40*
Time between birth of calves (in days)	420	391	385	384	*389*
Afterbirth problems in numbers	10	3	3	1	
Costs veterinarian per cow in Euro	104	90	**48**	**44**	*64*
N-balance of one year in kg per ha		-10.00	-18.00	-18.50	*35.20*
Costs of fertilizer per ha in Euro	65.30	58.00	28.20	28.20	*81.10*
Working hours saved	0	100	300	0	
Surplus measured against the **State without EM (in Euro)**		**16660**	**18500**	**24150**	

* Farm in Northwest Germany, 80 ha agricultural land / 13 ha corn, 2 ha fodder beets
80 cows incl. offspring, expanding to 100 cows in 2001/02

In 1997/98, the last year without EM, the farmerís income was 15,000 Euro less than that of his collegues. Even though working genetically on the same level he had about 900 kg less milk per cow. A dairy farmer wants to milk a large amount from the ground fodder, so that he does not have to feed from the expensive concentrate feed. He managed in this respect but nevertheless failed in getting the desired amount of milk. Already in his first year of using EM the farmerís economic situation improved. When we came to visit in autumn we noticed he had a new and comfortable car. Having integrated EM into the feeding process also saved him time. He reported that at last he had more time for his children. With EM, he added, his animals were much calmer, without stress, and he felt less stress himself.

In the second year he had the breakthrough. Steadily the quantity of milk was raised, and other data like the animals health and fertility improved as well. Seeing this progress the farmer decided to build the new stable for a larger number of cows (ca. 100 + offspring).

Additional milk quota in the EU cost approximately 0.75 Euro per kg. The price for a stable is calculated at about 3.000 Euro per cow. With this decision the farmer and his family committed themselves to invest 500.000 Euro and therefore to stay farmers for the next 20 years at least. The reason for taking this risk lies in the fact that the farmer and his wife have reached a situation where they feel confident in their future. Now for the first time, they say, they have experienced no alarming, unusual occurences in their

work. The animals are healthy, look good, produce sufficient milk and offspring - and finally the earnings are satisfactory.
In the beginning of 2001 the farmer bought the milk quota and the cows and started planning new stable. In the course of the year 2001 he held 120 cows in order to use the quota because for this winter he only has room for 80 cows in his stable. Since he reared almost all of his calves without selecting them genetically, the average amount of milk decreased. The yield of milk from ground feed, however, went up. This indicates that the quality of ground feed was improved. In fact, the farmer had only started to spray EM on his fields in the summer of 1999 which apparently improved the quality and amount of the ground feed (grass, corn).
Actually today he could easily change his farm into an organic farm operation. This, however, does not fit into his way of thinking. Also, the fact that the farm sells more than 18 kg more N - as milk and meat - than they buy in fertilizer and concentrate feed is of little importance for them. It is important for the improvement of the ground water, though.
The new stable will be finished in 2002 so that they can milk 100 cows instead of only 80. They will be able to handle more with less stress. The income is sufficient now and the farmer already makes plans of taking over the farms of two older collegues in the same area who indicated that they wanted to give up farming. He feels economically strong enough to do this.

More Profit for Europe's Dairy Farms by Using EM

In Europe EM is being used primarily in dairy operations. Traditionally raising cattle is an important basis for farming in Europe. Under our climatic conditions a price of Euro 0.30 per kg milk allows the existence of a farmer keeping 60 cows. This kind of herd needs to grow by 1-2 animals per year. Because of genetic progress the average milk production rises by 150 kg per year. This kind of 'progress' leads to an increasing number of problematic herds - most probably in respect to health and immune system. This is where EM can play an important role for improvement.
The kind of economic benefits a farming unit with major problems can expect, is shown in an overview drawn from the experience of 10 different farms in Germany:

Table 3 Economic Benefits for Dairy Farms with Severe Problems when Using EM

Size of operation in ha	60 to 3,500
Number of cows	35 to 450
Milk production at start	3.200 to 8.300 kg/cow/year
Costs of EM per cow	11 Euro to 33.50 Euro/cow/year average
Progress in 2nd year	435 kg/cow/year 152.25 Euro
Savings	
Claw care	7.50 Euro
Silage starters	15.70 Euro
Additives for manure	74.0 Euro
Insecticides	43.0 Euro
Vetarinarian	44.20 Euro
Costs for machinery	12.20 Euro
Sum of more milk, less costs and costs for EM	220.50 Euro

In excellent dairy operations the profit per cow is at 650 Euro. Therefore EM can play an important role in further developing a dairy farm if the farm is in operational trouble.

EM in Grain and Vegetable Production

Recently the first reliable data has been collected from farms which produce grains and vegetables. For such trials we try to recruit farmers who have a good standing among other farmers in a given region.

A number of farmers used EM with potatoes and sugar beets for the first time in 2001. Depending on the varying conditions already the yields were between 5% and 20% higher in the first year.

All grain farmers who used EM for the first time in 2001 reported higher protein and considerably bigger grains. All these farms will use EM on a larger scale next year, basically because they are attracted by the economic perspective.

The Chamber of Agriculture has started to launch the first trials for EM in the sugar beet production. As you all know, often it is more difficult to get the scientists and professional advisors interested in EM, more difficult than farmers because they see the practical advantages much sooner.

Tomatoes grown with EM have been examined for their holistic quality by German Professors who have developed two different ways of testing. Prof. Hofmann examines the Redox-Potential electronically. To briefly summarize it: the more free electrons are available for human consumption the higher the quality of the tested food. One test costs about 35 Euro, thus it is much cheaper than a regular vitamin test. Prof. Popp on the other hand, measures the capacity of any material to store light (bio-photones). The more storage-capacity the higher the quality. (By the way - already one year ago both regular tap water with 1/1000 EM-X, and tap water taken by EM-X ceramic pipes were tested as high quality.)

The fruit and vegetables which are tested as high quality by both methods also proved to win a test in taste. At the same time they can be stored much longer and they are better to handle.
Our EM tomatoes reached top scores at both tests. This encouraged us to look for governmental research funds to do a series of these alternative tests with EM fruit, grain and vegetables.

This way it would be easier to get grocers and parts of the food industry interested in EM because these tests could reliably show the best quality food. This situation would grant the growers using EM not only higher prices but also constant and growing demand. Again, others would see the economic advantages and start using EM. I believe, to put the economic aspect in the foreground in the initial work to promote EM as a plausible and helpful approach.