The Agriton system for a healthy dairy farming

For a good production without problems!

Contents

Part 1: Introduction.

Agriton has been founded in 1991. In the beginning Agriton focused on allotment gardeners. After developing a cattle slurry treatment product agriculture showed more and more interest and Agriton has developed itself to a company which is now focusing on the creation of a sustainable agriculture. The philosophy and conviction of Agriton is that in a sustainable agriculture a high soil fertility is very essential. Agriton does not only give attention to the physical and chemical processes as conventional science is still doing, but also to the very important biological processes. A high soil fertility produces sufficient healthy food and feed increasing the natural resistance in humans, animals, plants and soils and diseases will get less chances to develop. In the present agriculture soil fertility is due to different causes yet not optimal or even bad. This can be considerably improved using modern techniques in order to manage an authentic and natural agriculture. Meant is: an agriculture in which many processes on a farm will be influenced positively and no contrary processes will take place. This philosophy is based on the very interesting book: "The secrets of a fertile soil", written by Ir. Erhard Hennig. Many aspects to achieve a high soil fertility have been discussed in this book. Besides the EM-technology developed by Prof. Dr. Teruo Higa from Japan, plays an important roll in the Agriton system. New in this technology is that with help of a mix of microorganisms all kinds of fermentation processes are stimulated. This fermentation means a more efficient use of energy, production of better useful nutrients and less production of non useful waste products.That's why the EM-technology has the possibilities and capacities to maintain high production levels and yet to make a transition to an authentic natural agriculture.

Agriton does not make a choice between conventional or biological (dynamic) farms. Agriton does not forbid the use of chemical fertilisers or chemical plant protection products, but Agriton advises to make a reduced use of these products. Such products do not only have positive but also negative results. When all processes in soil, plant, animal and manure are tuned in each other and the parts will influence each other positively, a natural agriculture can be created in which with less inputs still a high production can be achieved.
Futhermore the quality of the products will increase and environmental problems will disappear. The Agriton products can be applicated in all farm systems and they will improve all side conditions on the farm in order to achieve this more natural agriculture.
Agriton mainly focuses it's activities on dairy farms. However Agriton products are used in many other sectors in agriculture. Some examples are horticulture growing of all kinds of flower bulbs, pig and poultry breeding a.s.o.

The following products are advised by the Agiton system:

- cattle slurry treatment: Agrimest mineral, Agrimest fluid, EM-1
- Ostrea sea shell calcium
- Edasil clay minerals
- EM Effective Microorganisms

Part 2: Problems in Dairy farming

Dutch dairy farming meets serious problems, dairy farming has to fight with great nutrient losses (costs money and pollutes the enviroment), MINAS (declaration of minerals), more diseases are threatening dairy farming and human beings for example BSE or para-TBC, milk

prices are constantly under pressure and dairy farmers still have to invest money to keep up date. The current solution for these problems have been found in production shrinking, fine fertilising, balance sheets of minerals, green lable cow houses, medicins, antibiotics, milk robots, etc. with all these solutions, yet the inputs (chemical fertilisers) have to be decreased and production will go down. Agriton has a total different view to possibilities to solve these problems. This view has to do with all processes at the dairy farm which means that cattle manure, soil, nutrition and the cow have to be tuned in each other positively. With in the Agriton system the most important aspects are to stimulate a healthy soil fertility and a microbial milieu in which fermentation processes will be activated. These aspects lead to a live cicle at the were by each part will improve eachother. A healthy soil fertility producess enough and healthy feed, which leads to a healthy cow which can produce surficient quantities of milk, giving a ferteil manure which again leads to a healthy soil fertility. Agriton is convinced, surpported by reaserch from the Agricultural Univeersity Wageningen that with this system the inputs can be reduced maintaining the present production level.

2.1 Cattle slurry

According to Agriton cattle manure is of a bad quality at many farms and Agriton believes that this quality can be improved radically. The causes of this bad quality are:

- The cow gets large quantities of high nitrogen feed
- Green feed has to many proteins (nitrogen) which can not metabolised completely by the cow, resulting in to much nitrogen in the cattle slurry
- Faeces and urine are gathered in one bassin resulting in a process called urease which plays a role in production of ammonia.

Due to these factors a cattle slurry will created very rich in nitrogen but poor in carbon. The C/N ratio (Carbon/Nitrogen) in this slurry is very low, often lower than 5 (C:N = 5:1). In literature it is many times stated that the C/N ratio should be around 10 (C:N = 10:1). Carbon serves in the cattle slurry as an energy source for microorganisms. Because there is a view carbon present certain microorganisms will develop resulting in a putrefaction process. In this putrefaction process the following processes will take place

- The organic matter will be converted in all kinds of relative in soluble in organic compounds.
- All kinds of phytotoxic (plant poisening) compounds will be produced.
- Harmfull products like hydrogen sulphide, chlor hydrogen, phosphorus hydrogen will be originated.
- Foul odours
- Cattle slurry will loose nitrogen through ammonia evaporation.
- In this putrefaction process degenerating bacteria are dominant resulting in a cow house climate in which diseases can develop themselves better.
- A demixture in the cattle slurry will take place and a cake layer will occur

If a cattle slurry will be treated with Agrimest and EM is also applicated the putrefaction process can be transformend in to a fermentation process (ripening).
With Agrimest the circumstances can be influenced in such a way that more energy will be available and through that the EM Effective Microorganisms can convert harmful substaces into useful compounds. Putrefaction will become fermentation (reipening). This means that regenerating microorganisms will dominate and through that no harmfull compounds will develop but just useful easy absorbale nutrients for the soil.

Results of this fermentation process:

- Reduced foul odours in the slurry
- Improved cow house climate = less diseases
- Limiting nitrogen losses through possible ammonia beinding
- Reducing the use of chemical fertilisers
- No or nearly no cake forming
- Homogeneous composition of the cattle slurry
- Nearly no mixing required
- No phytotoxic (plant poisening) compounds

2.1.1 Grass-land

Physical and chemical:

The department Animal Production Systems of the Agricultural University Wageningen has investigated the nutriant streams on dairy farms and from this it becomes clear that in the past decennia the utilisation of nitrogen has been decreased drastically. In present dairy farming a utilisation percentage for nitrogen lay between 15-20%. From all suppied nitrogen 80% is lost! At the same time this research regarding this drastic decrease of the nitrogen utillistion is imputed to the decrease of the utillisation in the spoil. Solutions to reduce the nutriant losses can be achieved by:

1. Decreasing the gifts of chemical fertilisers
2. Increasing of the utilistation rate in the soil

For many years Agriton is propagating to reduce the use of chemical plant production products and chemical fertilisers while maintaining the desired production by increasing soil fertility. The soil fertility plays an important role within the Agriton concept. By soil fertility Agriton means not only the quantity of nutrients in the soil but besides also the structure, the water holding capacity, the oxygen regulating capacity, texture, acid value (pH), soil life, etc. A high soil fertility provides a soil which is able to give the plant all required nutrients in a mainly natural way and to prevent diseases by a strong natural resistance. It is very important that one has to feed soil life instead of feeding the plant directly with inorganic and especially organic nutrients. With the present soil management hardly a contribution is delivered to this soil fertility. The applied inorganic fertilisers are directly absorbable by the plant and are applied like in substrate cultivation (the plant is fed instead of the soil). This substrate cultivation however has negative consequenses for soil fertility. It is true that the quantity of nutrients is increasing but the soil is less able to bind these nutrients (50-80% losses), the structure is getting worse the water binding and oxygen regulating capacity is decreasing etc.

Seldom more than 50% of the nitrogen fertilisers is assimilated (taken up) by the plant, whereas the efficiency of the utilisation is still lower. Whatever kind of chemical fertiliser will be used, the microbial activity convert these chemical fertilisers into nitrate, this is a mobile form which can be used by the plant but can pollute surface waters and rivers and lakes and will finally disturb the ecosystems. Nitrate will rinse out to the ground water resources and will pollute water springs.

Biological:

Soil life will be influenced by frequent use of chemical plant protection products and chemical fertilisers. In the soil a milieu will be created in which certain pathogenic microorganisms will be dominant, through which mainly the degenerating processes (putrefaction) will dominate and no metabolism products such as vitamins, enzyms and antioxidants will be produced. The result is a disease inducing soil instead of a disease

suppressing soil. At the same time the microbial activity in the soil decreases, due to which all kinds of processes will slow down.

Chemical fertilisers – organic manure:

In order to avoid confusion it is useful to explain the thoughts of Agriton regarding chemical fertilisers. Many people consider chemical fertilisers as an ideal plant nutrition. It is unquestionable that chemical fertilisers can have great effects in production which led Dutch agriculture to a great extent. Excessive use of chemical fertilisers has however disadvantages as it has become clear in the last years. It led for example via rinse out to water pollution, more over it hardly contributes to a sustainable soil fertility (for example structure) and a constant use of chemical fertilisers is negative for soil life (microorganisms, earthworms). There are also reasons to doubt the quality of the produced crops (high nitrate, few vitamins, minerals, antioxidants, antibiotics, lot of water, few dry matter, poor in structure). Quality organic manure can contribute to a sustainable soil fertility. Nutrients can be adsorbed in the soil and can come available for the plant at the right moment. This microbial activity in the soil will increase, and that's why more nutrients will be released for the plant. In such a soil more trace elements will be released and an shortages will not occur. Having the right management much less chemical fertilisers are needed in order to maintain a good production. In this management chemical fertilisers can still be used. Experience teaches that the use of chemical fertilisers can be reduced during a number of years, so that the soil can slowly be formed into a sustainable soil. Agriton does not propagate a total abolishment of chemical fertilisers but a gradual decrease in the gifts of chemical fertilisers.

In the air and soil enormous quantities of nitrogen are present. These nitrogen stocks can come available for the plants by microorganisms and certain kinds of plants. Nitrogen from the air can be fixed in the soil by microorganisms and nitrogen binding plants, like clover, lucerne. In a soil having a good soil life fixed nitrogen can be released for the plants.

2.1.2 Green feed

Due too the large amounts of chemical fertilisers and plant protection products the quality of the grass will be influeced negatively. The present judgement worth like VEM and DVE are pure physical and chemical judgement criteria. Quality of feed is however more than VEM and DVE, there is also still a biological worth. With a biological worth is meant that there are for instance all trace element present, as well as vitamins, antibiotics and other bio active-compaunds produced by microorganisms. These nutrients are very important for the health of animals. In present argriculture many inorganic nutients are given to the plant, which means that the plant has no other choice than to take up these nutrients. The plant for instance takes up much inorganic nitrogen (chemical fertiliser); the plant has to take up water in order to digesst this nitrogen and due to this action again more nitrogen will be taken up by the plant. In this way there will be grass with high amounts of nitrate, which can be mortal for the cow. We can hardly claim that this grass will be of a high quality.

2.1.3 The cow

The cow has to endure many problems in present agriculture. She is working the whole day at a top level and in a bad milieu (putrefaction of cattel slurry) where disease pressure is high and she is getting feed in which some important parts are missing. It is therefore not surprising that cow will get difficulties with fertility, diseases and they will be put off after some years. With the Agriton system however we can improve the cow house climate and the quality of feed due to which the hewalth of the cow improves. She will have less problems with diseases, fertility etc. and there will be more energy left for milk producion.

Part 3: Products of Agriton.

3.1 Agrimest mineral and Agrimest fluid
3.1.1 Composition of Agrimest mineral and Agrimest fuid

the cattle slurry treatment consists of Agrimest mineral and Agrimest fuid, quite often EM Effective Microorganismsm will also be added.

3.1.2 Effects of Agrimest mineral and Agrimest fluid

Agrimest consists of energised minerals. These energised minerals play an important role in some complicated biochemical processes. It is supposed that these m9inerals have cooperated as a catalist at the very beginning of the earth in the synthesis of protiens and nucleic acids and they have been involved in the creation of living microorganisms. At present it is well known that each mineral can store energy (for instance in the form of radiation/light) and they can release this energy again. This energy can be the start of each life development of it's biological ordered symthesis. Agri mest can influence the circumstances in the cattle slurry in such a way that more energy will be available for the microbes in the slurry resultiong in anaerobic fermentation. This fermentation means a better fermentation of the slurry. No harmfull compaunds will be produced but only nutrients and bio-active compaunds which are easily to be assimilated by the plant and can stimulate plant's growth. A high quality cattle slurry wil be developet in which synthetic microorganisms will dominate and virus- and other diseases will get no chance to develop.

Fermentation by:	Putrefaction by:
Anaerobic photosynthetic bacteria	Anearobic heterotrophic bacteria
They create:	They create:
Stable humus	Instable humus
Trace elements	Hydrogen sulphide
Nitrogen fixation	Hydrochloric acid
Antibiotics	Ammonia
Amino acids	Toxic compounds
Vitamins	Nitrogen losses
Prevention of diseases	Causes diseases

Results of this fermentation:

- Odour free till odour poor slurry

- Improves climate in cow houses – less flies
- Limitation of nitrogen losses through possible ammonia fixation
- Reduction of chemical fertiliser gifts
- Homogeneous composition of the slurry
- No or nearly floating cake
- No or nearly no mixing required
- No phytotoxic (plant poisening) compounds

3.2 Ostrea sea shell calcium

3.2.1 Composition of Ostrea sea shells

Sea shells are a calcium source which are found on shell banks in the North Sea. Later these shells will be dried and crushed sea shell calcium is very rich in calcium carbonate (96.1%) and contain very few water. The dry matter is 99.5%. The sour binding value is 54.
The central labatory of C.H.V.-Encebe NV and Sobel NV made an mineral analysis with the following results:

Dry matter		99.5%	Copper		1	mg/kg
Ashes		97.5%	Iron		5266	mg/kg
Phosphorus		0.05%	Mangan		63	mg/kg
Calcium		37.7%	Zinc		5	mg/kg
Carbonate ($CaCO^3$)		96.1%	Cobalt	<	0.5	mg/kg
In vitro Calcium		100%	Arsenic		15.9	mg/kg
Sodium		0,4%	Selenium		0.03	mg/kg
Potassium	<	0.01%	Cadmium	<	0,2	mg/kg
Magnesium		0.02%	Lead	<	0,2	mg/kg
			Mercury		0.03	mg/kg
			Sulphate		454	mg/kg
			Chloride		870	mg/kg
			Iodide	<	15	mg/kg
			Fluorine		160	mg/kg

The Quist Labaratory at Aarhus in Denmark measured the solubility of different kinds of calcium. Normal agricultural calcium (limestone) and our sea shell calcium have been submerged in hydrochlorid acid of 99%. Below you will be given the number of minutes which the two kinds of calcium needed to be dissolved.

Agricultural calcium (limestone)	60 minutes
Ostrea sea shell calcium	750 minutes

3.2.2 Effects of Ostrea sea shell calcium

The pH:
A good pH in the soil is very important for a good plant growth. If the pH of the soil is low (sour) different nutrients will be fixed in the soil and the plant can not take them up. In this way many deficiency phenomena, which lead to crop losses. If the pH in the soil is too high the same symptoms will occur. In present soil analyses an optimal pH (PCl) of 5 is advised for sandy soils, clay soil and loamy soil and a pH of 4.8 for peat soil. This is not correct

according to Agriton. The pH at which a soil is functioning optimaly depends on the kind of soil. For each soil an optimal pH is given below.

pH aims for different soils:

kind of soil	sandy	sandy-loamy	loamy	clay
pH (PCl)	5.2-6.0	5.7-6.5	5.9-6.7	6.1-6.9
pH (H_20)	6.3	6.8	7.0	7.2

An advantage of Ostrea crushed sea shell calcium is that it has an effect over a long period and can avoid too high or too low pH levels. So the pH will be influenced by the calcium during a long time through which an optimal plant growth can occur.

Soil life:
Having a favourable pH the microbial soil life will be promoted. This has different consequenses for the plant growth. The quicker mineralisation in the soil leads to more nutrients, N, P, K as well as trace elements through which defficiency phenomena growth arrears will be avoided. The microorganisms produce all kinds of bio-active compounds (vitamins, antioxidants, antibiotics, hormons) which can improve the quantity as well as the quality of the crop. The microbial soil life will also improve the air and water houshold. Besides correcting the acid level calcium (Ca) has still a positeve effect on soil structure and can again release fixed nutrients. Ostrea sea shell calcium also contains many trace elements. The sea shells are produced by shell-fishes and these shell-fishes take care of the fact that all trace elements out of sea water will be present in the shells. Using this source of calcium many trace elements will be given to the soil at the same time.

3.2.3 Clay minerals

3.3 Composition of clay minerals

The Edasil clay minerals are digged off in South Germany. The grain particle size mainly lays between 2.0-5.0 mm (73-77%).

Composition:

Montmorillonites	70-80 %
Specific area	600-800m^2/g
Ion exchange capacity	70-85 mvol/100 g
Water holding capacity	135 %
Water amount	6-8 %
pH	7-8
Basic effect	4 %
Density	2.6 g/em^3

Chemical analysis:

Siliciumoxide	circa 56	%
Ironoxide	circa 0.4	%
Aluminumoxide	circa 16.0	%
Calciumoxide	circa 4.0	%
Magnesiumoxide	circa 4.0	%
Potassiumoxide	circa 2.0	%
Sodiumoxide	circa 0,4	%

Trace elements:

Borium	circa 1000 ppm.
Cobalt	circa 35 ppm.
Copper	circa 20 ppm.
Mangan	circa 300 ppm.
Molybden	circa 20 ppm.

Nickel	circa	50 ppm.
Zinc	circa	90 ppm.

3.3.1 Effects of clay minerals

Clay minerals belong to the smallest particles occuring in the soil. Remarkable of these clay minerals is the combination of their form and composition. They consist of many thin layers resulting in a large surface area per weight unit. This surface area for Bentonite clay minerals can rise up to 800 m^2/gramm, comparable with the most occuring clay mineral (Illite) which has maximum 150 m^2/gramm. Due to their chemical composition clay minerals are electrical charged at their edges. This charge will always be neutralised by irons in the soil. This means that clay minerals have a great iron binding capacity. Due to these features clay minerals can play an important role in soil fertility.

Adsorbtion:
The great adsorbtion (binding) capacity of clay minerals has an important function. The clay minerals take care of the fact that many ions (K,Ca, Mg, Na, NH^4) and trace elements will be fixed and will be released when the concentration of one of these elements decreases in the soil. Nitrates are not fixed by clay minerals directly but due to the improved soil structure there is less chance that nitrate will rinse out.

Clay humus complex:
Clay minerals can form with aluminum-ions (Al) the clay-aluminum complex and with organic particles the clay-humus complex. These complexes consist of many clay particles aluminum ions/humus molecules and even small sandy particles. Microorganisms play in this process an important roll. Both complexes are of great importance for soil fertility. Due to their form they promote the stable structure of the soil which is essential for the optimalisation of the water- air- and temperature household in the soil, which again influence the physical, chemical and biologycal processes in the soil. Both complexes play beside also a role in the pH-buffer and in the regulation of the concentration phosphate, sulphate and trace elements.

Microorganisms:
Microorganisms play an important role in soil fertility. They play in nearly all processes in the soil a role for instance during mineralistion humus formation etc. The clay minerals and the complexes which have been formed are an ideal life milieu for microorganisms and they will be able to function more efficient. The clay minerals and the complexes are offering the microorganisms:

- a large surface area on which they can sattle themselves
- a stable supply of water through which they can survive
- via the small pores they get protection against bigger organisms which eat bacteria (protozoa).

3.3.2 EM Effective Microorganisms

3.4 Composition of EM Effective Microorganisms

EM is a product developed by Prof. Teruo Higa from the Ryukyus University in Japan. EM consists of different kinds of microorganisms, 5 families, 10 generations and 82 species.

Families:	Generations:
Lactic acid bacteria	Streptomyces albus albus
Photosynthetic bacteria	Rhodopseudomonas sphaeroides
Yeasts	Lactobacillus plantarum
Actinomycetes	Propionibacterium freudenreichii
Moulds	Streptococcus lactis
	Streptococcus faecalis
	Aspergillus oryzae
	Mucor hiemalis
	Saccharomyces cerivisiae
	Candida utilis

3.4.1 Effects of EM Effective Microorganisms

EM-technology has two important effective principles

1. The dominant principle
2. The fermentation principle

The dominant principle:
The dominant principle works as follows. In general there are three kinds of microorganisms:

- the degenerating ones
- the opportunists
- the regenerating ones

The opportunists are the largest group. They follow the group which is dominant in the system. When the degenerating microorganisms are predominating the opportunists will follow the degenerating processes and there will a climate come into existence in which degeneration revails. When the regenerating microorganisms will be predominating the opportunists will follow the regenerating processes and there will come a climate into existence in which regeneration prevails. Which kind of microorganisms will prevail is dependable of the milieu in which they live. In conventional agriculture we create due to an exessive use of putrefacted animal slurry, chemical fertilisers and chemical plant protection products an environment in which the degenerating microorganisms will prevail developing all kinds of diseases.

The fermentation principle:
Everywhere all kinds of microbial processes take place. Waste products will be converted into useful efficient compounds. These processes can however take place under different environmental circumstances (dependable of which microorganisms are dominant, nutrition, temperature, etc.) through which degeneration or regeneration will take place in different ways. During degeneration different negative compounds will be produced and different amounts of energy will be lost. During regeneration different positive compounds will be produced and energy will be saved. The latter process is of vital importance for soil and plant. We can make difference between the oxidative (aerobic) and the fermentative (anaerobic) processes. Within the fermentative processes we can make a difference between useful fermentation (ripening) and harmful fermentation (putrefaction). It is important to remark that many of these processes can take place at the same time.

Oxidation (aerobic)	Fermentation (anaerobic)
useful fermentation (ripening)	harmful fermentation (putrefaction)

Oxidation:

Oxidation is a process in which certain microorganisms will break down organic molecules aerobically. Hereby insoluble inorganic nutrients develop which can be absorbed by the plant directly. At the same time CO^2 and a lot of heat will originate. During this process a lot of energy will be lost.

Harmful fermentation or putrefaction

Putrefaction is the process in which certain microorganisms break down proteins anaerobically, producing foul odours and not complete broken down metabolism products which are mostly poisening for plant and animal (ammonia, indols, scatols, mercaptans, hydrogensulfides and methane). Futher these products will be converted into other harmful compounds and relative insoluble inorganic compounds. When however photosynthetic bacteria are present, these bacteria can utilise the putrefaction compounds produced under anaerobic cicumstances in order to make out of them useful compounds. The putrefaction process can be converted into a fermentation process (ripening)

Useful fermentation or ripenig:

Ripening is the anaerobic process in which certain microorganisms can break down complex organic molecules into simple organic and inorganic compounds which the plant can take up directly. At the same time metabolism products will be produced by microrganisms like antibiotics, hormons, vitamins, enzyms, antioxidants, etc. which are absorbable for the plant. These products can stimulate the growth of plants and can improve the natural resistance in soil, plant and animal and through that suppress diseases. The antioxidants can take care of the fact that less oxidation occurs, through which the fermentation process will be stimulated. This fermentation looses a small amount of energy which means that more energy will be retained in the product. This ripening process occurs among others during the preparation of sauerkraut. The original white cabbage has less nutrient value than the fermented sauerkraut.

Conclusions about EM-technology

EM-technology influences the microbial milieu in such a way that the regenerating microorganisms will prevail. Through this a milieu will be created in which microorganisms through fermentation will play a positive role with respect to plant growth, plant quality and soil fertility. Fermentative conversion will be stimulated and putrefaction will less occur through which less energy will be lost. A soil in which the regenerating microorganisms will prevail can maintain high production levels, suppress diseases and produce high quality crops in this way.

3.4.2 Applications of EM Effective Microorganisms:

EM has different application possebilities in dairy farming. These applications are:

- To put into cattle slurry
- To spray grass-land
- To spray the sileage
- To spray the feed
- To spray the cow house
- To mix through drinking water
- To make Bokashi

3.4.3 Bokashi

Bokashi consists of a mix of minimal three organic materials which will be fermented with the help of EM Effective Microorganisms. After mixing, this Bokashi will be packed anaerobically and a fermentation process wil take place producing many metabolism products from microorganisms. All organic waste products can be used for this fermentation. Like with sauerkraut Bokashi gets a higher food value than non-fermented organic substances.
The Bokashi-principal can be used to make a soil improver as well as to make animal feed.

Materials for Bokashi:
Each organic material is suitable to make Bokashi, some examples are wet grains from beer breweries, wheat bran, rice bran, maize flour etc. It is wished to choose a combination of organic materials, having a high as well as a low C/N ratio. In general at least 3 different organic materials are advised in order to increase the microbial diversity.

Preparation of Bokashi:

Organic material	150 liters
EM-1	150 cc
Molasses	150 cc
Water*	15 liters
Clay minerals	2.5 kg
Sea shell flour	2.5 kg

*The quantity of water is dependable to the humidity of the used materials. The humidity degree may not be higher than 30%. This can be controled as follows: you dig out a handful of Bokashi and squeeze it. It should stay in a solid clumb with no fluid coming out of it.

Part 4: The practical Agriton advice

Slurry treatment:
At the beginning of the stable period/ beginning slurry treatment
Per 100 m^3 cattle slurry:

- 1kg Agrimest mineral and 1 liter Agrimest fluid to be mixed in 10 liters of water and add the mixture into the slurry
- 0.5 liter EM-1 = 16.6 liters EM-A diluted and add into the slurry

from then on every day during stable period:

- 100-200 gramms Agrimest mineral
- plus/minus 40 ml Agrimest fluid (2 bottle caps) to be mixed in 10 liters of water and pure this mixture each day on another place into the slurry resulting in a good division

after to till four weeks:

- 0,5 liter EM-1 = 16.6 liters EM-A diluted and add into the slurry

Ostrea sea shell calcium:	every 3 years 500 kg/hectare
Edasil clay minerals:	200 kg per hectare per year

EM (see manual): EM-1

Soil improvement (grass-land)	2liters per hectare
Spraying in the stable	1 liter
Sileage improvement (per $100m^3$)	1 liter
Drinking water	
1^{st} month (per 1000 liter)	1 liter
next months	0.1 liter

Bokashi: 250-500 gramms per cow per day

Chemical fertilisers: dependable to the nitrogen givts in previous years:

1^{st} year:	25-50 % less
2^{nd}-3^{rd} year (dependable to observations)	50-75 % less

Part 5: Instruction manual EM Effective Microorganisms

Preparations and applications

1. EM-1, EM-A and EM-solution

5.1. EM-1, EM-A and EM-solution

EM-1 is the name of the starting product Effective Microorganisms which Agriton is delivering in plastic bottles of 1 liter and plastic containers of 10 and 25 liters. In order to applicate these in agriculture EM-1 can be activated. Activating the original EM-1 takes place through adding water and molasses (nutrition). This activated EM-1 is called EM-A and will be produced as follows:

Total:	**10 liters EM-A**	**100 liters EM-A**	**1000 liters EM-A**
EM-1 3 %	0.3 liters	3 liters	30 liters
Molasses 3 %	0.3 liters	3 liters	30 liters

Water 97 %	9.7 liters	97 liters	970 liters

This EM-A has to be kept over 7 days in an air tight container. A fermentation process will come into action resulting in a strong multiplication of microorganisms. The container should not be exposed to direct sunlight and preferable at a temperatur of 20-35º C. This EM-A is 14 days tenable.

EM-solution
Next EM-A can be diluted with water (1:10, 1:20, till maximum 1:100) after which it can be used for different applications. **This EM-A solution has to be used within 1-2 days**.

Applications	**EM-1**	**=EM-A**	**dilution ratio**	**EM-solution**
Soil improvement:	2 liter/ha	=66.6 liters	1:100	=max. 6660 liters/ha

5.2 Important features of EM.

The tenability of EM-1 is 6 months after the date of production. It should be kept air tight in a cool and dark place (not in the refrigerator)**.**
EM-1 has a sweet-sour smell. If EM has a foul odour (butyric acid), it should not be used any longer. After opening a bottle EM-1 oxygen can access and white yeast flakes can appear. These yeast flakes are completely harmless.

Tenabilty of EM products:

EM-1	6 months after date of production
EM-A	14 days after date of production
EM-A solution	1-2 days after preparation
EM-Bokashi	3-6 month after date of production