



Nuffield Farming Scholarships Trust

Is there a role in UK Agriculture for
Farming by the Cycles of the Moon?

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Farming by the Cycles of the Moon -

" A way out subject or a traditional farming method that has become largely forgotten due to cheap oil and growing food demands?"

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Disclaimer

The views expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust.

1. Introduction and objectives

I farm in partnership with my father, milking 170 cows on a conventional mixed farm of 390 acres at Lands End, Cornwall. The farm rears followers and store cattle, growing spring barley and spring cabbage

I became interested in my subject after attending a talk on "Gardening by the Moon" by Mr John Harris. At that time my knowledge of the subject was very limited but I instantly became curious to find out more and see whether it could be applied to agriculture.

Over recent years I have become concerned about the environmental impact of our conventional methods of farming, so I hope my study will aid me in farming in a more environmentally friendly way in the future.



How did we manage before chemicals and fertilisers? Can the moon really affect farming and reduce our inputs? It can affect the vast oceans, and human behaviour. It is a fact that the police will increase officers on duty at football matches or similar events when there is a full moon.

Then why can it not play a part in the germination of a small seed, the quality of a harvested vegetable or the behaviour of farm animals?

The objectives of my Nuffield Study Tour therefore were:

- To visit farms and meet people who use the moon calendar
- To investigate the impact of the moon on crops and animals
- Ultimately to research if there is a role for farming by the cycles of the moon in UK agriculture.

"From Earth we see Sun and Moon as a pair, but in fact, from the Sun, Moon and Earth are a pair" (Llewellyn, 2010)

This quote by Carl Llewellyn Weschcke, Owner/President of Llewellyn Worldwide Ltd, publishers, leads me to believe that the moon is more relevant to the Earth than we think.

2. Some moon "basics"

a) The cycles of the moon

The moon has numerous cycles the four main ones being:

- waxing and waning
- ascending and descending
- sidereal cycle
- apogee-perigee cycle

i) Waxing and waning (the synodic cycle) : 29.5 days

Waxing is the moon growing from new moon to full moon. This is called the first and second quarter. The moon then wanes (shrinks) for the third and last quarter

ii) Ascending and descending : 27.3 days

This is simply the height of the moon above the observer's horizon.

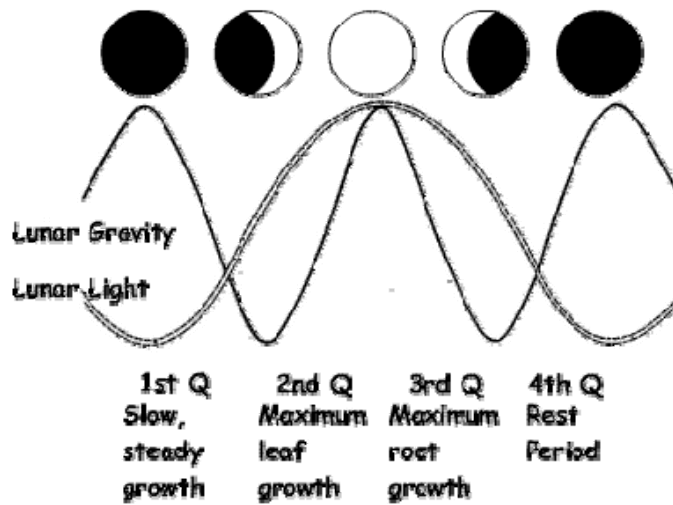
iii) Sidereal cycle 27.3 : days

This is the path of the moon through the 12 constellations of the Zodiac. It spends 2-3 days in each zodiacal constellation. This cycle has a link with the four elements (Earth, Air, Fire, Water), (*Kollerstrom, 2010*).

iv) Apogee-perigee cycle : 27.2 days

The moon moves around the earth in an elliptical orbit, so its distance from the earth varies considerably through the month. When the moon is at apogee it is at its furthest point from the earth and at perigee it is at its closest. This is the cycle that affects the tide. (*Kollerstrom, 2010*).

Fig 1 on the next page shows the growth of the moon from new moon to full moon and then back to a new moon. As you can see the lunar gravity rises and falls with this cycle, with the gravity pull being greater at new and full moon. This also shows the lunar light which obviously is at its strongest at full moon.

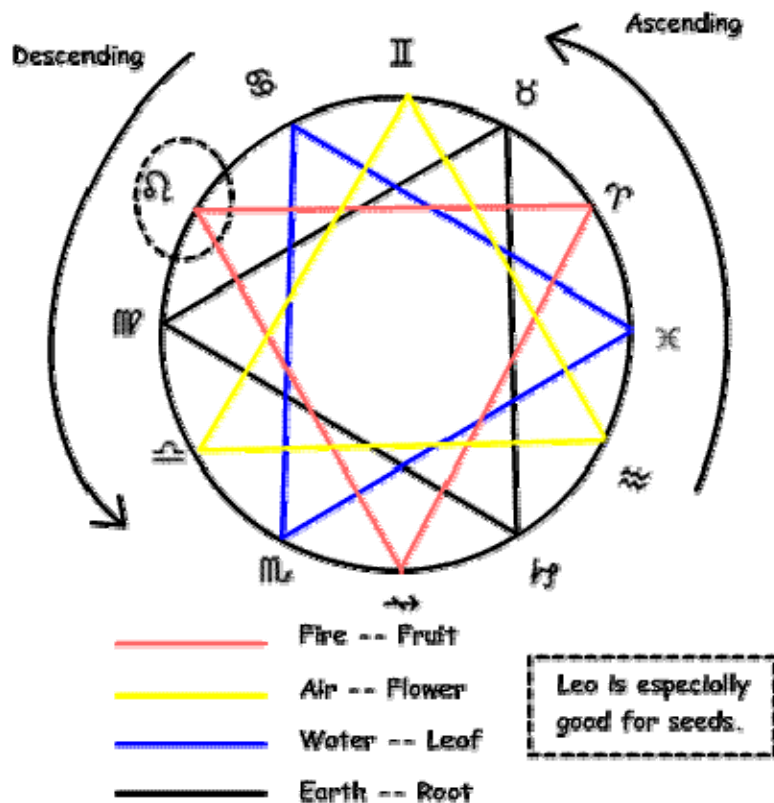


Lunar Growth Cycle

Fig. 1 (Oikos: Green building source, 2005)

b) The signs of the zodiac and the moon -

Diagram below ((Kollerstrom & Staudenmaier, 2001) shows the path of the moon through the 12 signs of the zodiac and the associated element.

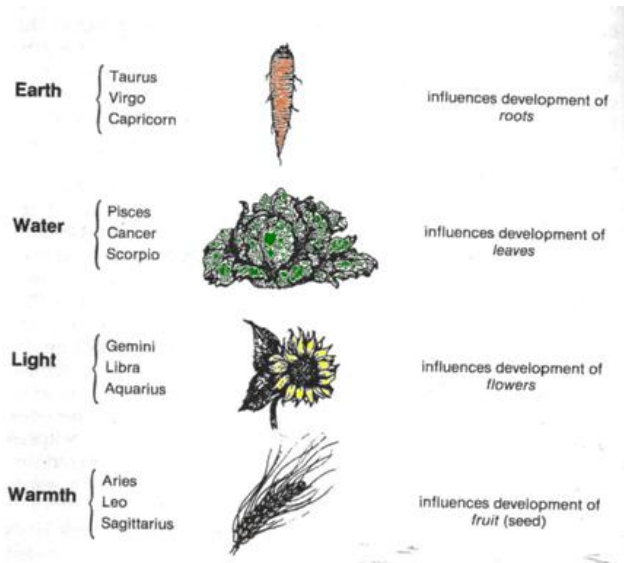


Planting by Moon Signs

c) Planting and harvesting by the moon

- i) Traditional moon planting suggests that :
- ii) plants producing their fruit above the ground should be planted in the first quarter
- iii) plants producing their fruit below ground such as root crops should be planted in the second quarter
- iv) compost or FYM (Farm yard manure), should be applied in the third quarter
- v) the fourth quarter is a good time to cultivate.
- vi) It is also suggested that the waning moon is best for castrating or any other operations where bleeding could be a problem. Some people also suggest that hay is better quality if cut on a waning moon as the sap content is less due to the reduced gravitational pull.
- vii) Moon farming can also refer to the sidereal cycle to determine the best time for planting, because each zodiacal sign is linked to one of the four Elements. Earth, Air, Fire and Water, (Kollerstrom, 2010).
- viii) To plant by the moon you need to identify the element that links to the crop:
 - Earth element - (root plants) e.g. beetroot, carrot, potatoes, onions and turnips.
 - Water - (leaf plants) Cabbage, Brussels sprouts, lettuce, spinach.
 - Air - (flowering plants) artichokes, cauliflower, broccoli.
 - Fire - (fruit-seed plants) blackberries, beans, peas and tomatoes etc, (Kollerstrom, 2010).
- ix) Once you have identified the element, you can use a lunar calendar to reference the ideal time to carry out various activities. Using the calendar is straight forward. Planting should be done weather permitting on the correct element day. For example planting potatoes should be done on a root day. It is also recommended that the soil should be prepared on a root day as well as weeding and harvesting, (Kollerstrom, 2010).
- x) The diagram on the next page (fig. 3) shows the four elements and their related zodiac signs. It also shows the associated plant for each element

Fig. 3 : the four elements and their related zodiac signs



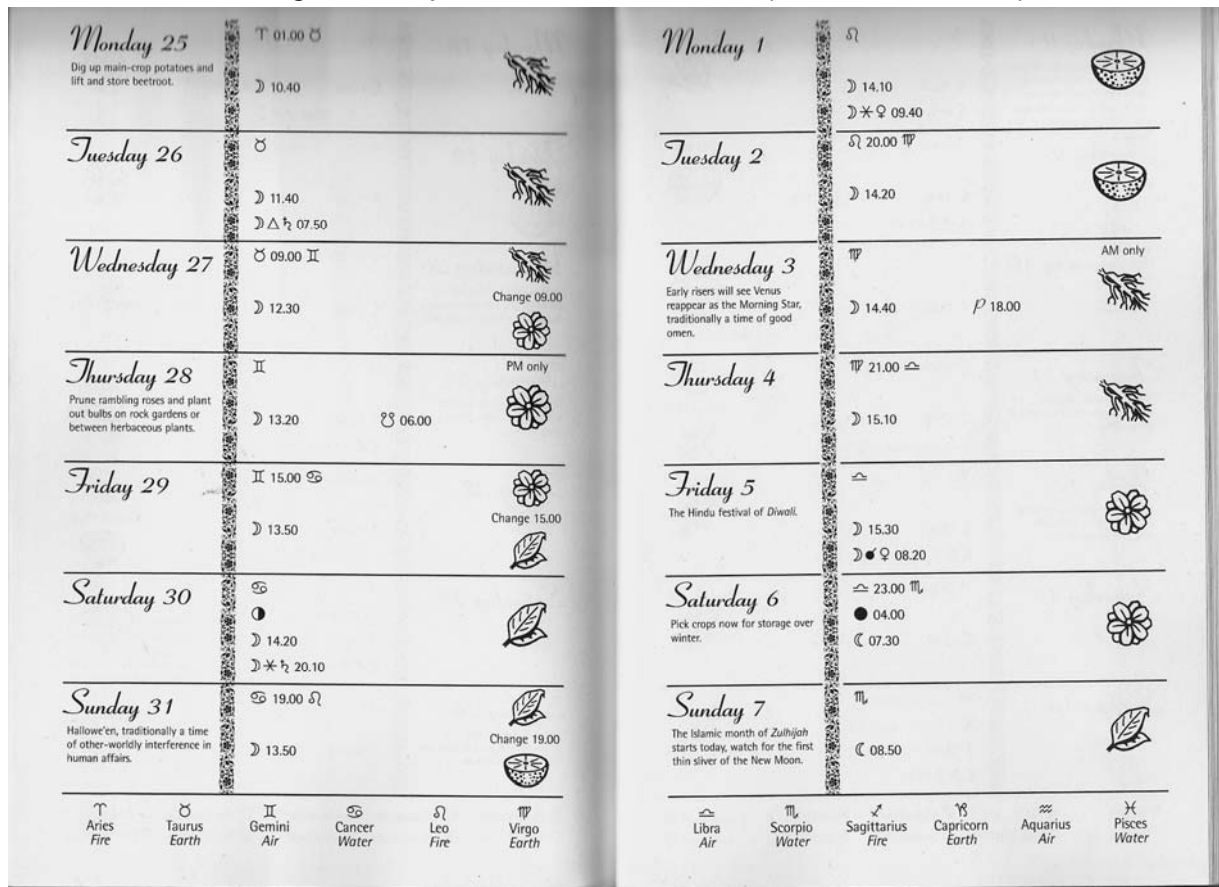
xi) All the farms that I visited referred to lunar calendar for the perfect timing to plant or harvest their crops. Here you can see a moon calendar in the kitchen, used for quick reference on a farm in Switzerland.



Fig.4 picture by (J. Ellis, 2010)

Although the calendars look confusing once you have used them they become very simple to follow.

Fig.5 Example of a moon calendar, (Kollerstrom, 2010).



This example of a moon calendar gives an idea as to the information it can tell us. Here we have a fortnight from the 25th of October to the 7th of November,. As you can see it clearly indicates the element days on the right. It starts with a root day on the 25th, changing to a flower day on the 27th at 09:00, and then changing again to a leaf day on the 29th at 1500. We are back to a root day on the 3rd.

You can also see on this day that the moon is at perigee indicating that it will be at its closest to the earth at 18:00. The calendar also indicates moon rise and set. The moon will set at 15.10 on the 4th and it will rise - indicated by the forward looking crescent - on the 6th.

We can also see that this example fortnight is actually the third and last quarter with a new moon plus start of the waxing moon on the 6th.

3. An introduction to Biodynamic farming

I soon learnt when I started to research my subject that following the cycles of the moon is mainly practised as part and parcel of Biodynamic farming. Biodynamics was used as an expression by Rudolf Steiner, an anthroposophist (spiritual philosopher, meaning wisdom of the human being), when he gave his famous agricultural lectures in the 1920s. He was requested by farmers to address the problems of poor vitality and disease in agricultural crops. His lectures described working with the cosmos, the earth and spiritual entities. In the expression "Biodynamics", bio refers to life and organisms while dynamics refer to the changing cyclical rhythms of nature. By farming biodynamically you are farming in a way that is full of life, rhythm and variety.

a) Methods of biodynamic farming

Biodynamic farming is an organic method of farming with strictly no use of artificial fertilizers or chemicals. A priority in this style of farming is the health of the soil. If the soil is in good condition it will provide the nutrients that the plants need. Those plants which are in good health will then give the animals and humans that consume them the nutrients that they need. The animals will then produce good quality manure which will complete the cycle, passing it back to the soil.

b) Preparations

Biodynamic farmers will apply preparations to improve the health of their soil and plants. These are considered the most important aspect of biodynamic farming and are probably the most difficult part of bio dynamics to understand. It could be said that these preparations are the biodynamic farmer's equivalent of conventional sprays and fertilizers.

Preparations are applied to all land and crops. The two most widely used are prep 500 and prep 501. 500 (horn manure) is made from manure which has been buried in cow horns underground through the winter. 501 (horn silica) is made from ground quartz which has been buried in the horns underground for the summer.

Preparations are made from mixing the contents of the horn with water, stirring (manually preferable) for one hour changing direction of the stir every minute or so. Seems like a daunting task but the hour soon passes and you feel a sense of achievement and satisfaction after completing the task. Preparation 500 is applied generally in the spring and autumn to all crops or seed beds. This enhances root growth and assists the roots to absorb nutrients. Preparation 501 is applied to crops that are about to bear fruit i.e. wheat at ear emergence, (Lovel, 2000).

Here you can see me carrying out the process of making preparation. Preparations are ideally made in a wooden barrel with warm water. The mixture should preferably be stirred with a Hazel stick but must be stirred rigorously, (Steiner, 1924).



Fig.6 photo by (J.G.Ellis, 2010)

Here you can see preparation 501 being applied. This preparation is usually applied as a mist, this farmer would drive around his fields along the road and let the wind take the mist over the crop. As there are no chemicals in the mixture farmers or their neighbours didn't seem to mind if it went over hedgerows, trees, gardens or even passing cars.



Fig 7 : preparation applied as a mist

c) Compost

I have mentioned the importance of manure on a biodynamic farm in particular cattle manure but it doesn't end there this should be turned into compost before applied to the soil. Biodynamic farmers believe that we should feed the soil and then let the soil feed the plant and not simply apply un composted manure i.e. slurry to the ground which then feeds the plant directly. This is what they say causes the weaknesses in plant making them susceptible to disease and pests, (Lovel, 2000)..

d) Compost preparations

An important part of making compost is taking care to layer the manure thinly as the pile is building up, and then applying the preparations 500 and 501 plus six other preparations.

- **Preparation 502** - is made from wild white yarrow (*Achillea millefolium*) which is packed into the bladder of a male elk, deer or moose and then exposed to the summer cosmic and winter earthly influences. This preparation is said to purify and detoxify the soil.
- **Preparation 503** - Is made from chamomile (*Matricaria chamomilla*) enclosed in the small intestines of a bovine and buried in soil for the winter. This preparation is said to relate to sulphur and potassium as well as calcium which pulls nitrogen into the soil.
- **Preparation 504** - This preparation is made from stinging nettles which are buried for one year when used in the composting process. It is said to give soil energy and help to improve a deficiency of Iron.
- **Preparation 505** - Is made from the bark of an oak tree which is packed into a farm animal's skull and placed in a spot where water trickles constantly for the autumn and winter. 505 is used in the composting process to improve the disease resistance of crops.
- **Preparation 506** – Is made from dandelions enclosed in the mesentery (part of the peritoneum) of a bovine and buried from October to Easter. 506 is said to help the plants to draw their nourishment from the surrounding environment.
- **Preparation 507** - Is made from the juice of valerian plant (*Valeriana officinalis*) and is used to activate phosphorus.

All these preparations are added to the compost heap in a set pattern: either poured into holes made in the pile or sprayed onto the surface. Good compost will look and feel just like soil and should not be of slimy consistency.

4. My Study Tour

Pictures of the Goetheanum Switzerland, where the Annual Biodynamic conference was held



Fig.8



Fig.8a

4a. Switzerland

My first port of call on my actual Nuffield study tour was a visit to Switzerland to attend the Biodynamic Annual Conference at the Goetheanum, (Steiner's Centre for Anthroposophy – wisdom of the human being), (Steiner, 2008). This was an excellent place to start my study. With over 650 people in attendance from 29 countries, it quickly became apparent that all were serious about biodynamics. They strongly believed in this method of farming and they were convinced that it was the only way for plants, humans, the soil and the cosmos to work together. At the conference I met biodynamic farmers who were very keen to help me with my study. As a result I had the opportunity to visit biodynamic farms in **Switzerland, Germany, Luxembourg, Italy and Canada.**

One of the guest speakers at the conference was Dr Ibrahim Abouleish from Sekem, a biodynamic farm in Egypt. In 1979 he established a 70 hectare biodynamic farm some 60 km north east of Cairo. Farming in the desert is no mean feat but it has been made possible over the years by the natural flooding of the Nile delta. However, never before has biodynamics been used to farm there.

By 1981 the Sekem farm was shipping its first active ingredient of medicinal herbs to the USA and two years later was producing its medicinal herb products for local markets. Diversification and extension of the farm into biodynamic cotton production and vegetables led to the first cotton exports to Germany and biodynamic vegetable exports to various locations in Europe in 1990.

By 1992 Sekem was manufacturing and marketing Weleda products under license in Egypt and became the principle standards agency for organic production in Egypt. By

1994 Sekem was exporting its own cotton clothing to Germany having added clothing manufacture to its portfolio. In 1996 a medicinal clinic was opened to offer a full range of medical services to its 2000 employees.

Now Sekem is farming 35 000 hectares and producing chemical free baby and children's food. All its farming is biodynamic, using the influences of the moon where possible. Dr Abouleish stressed the importance of making biodynamic compost - the farm is currently producing over 140 000 tonnes a year.

I was able to visit two working farms in Switzerland. They were small family farms. One farm kept about 20 beef cattle reared purely on grass and hay, and the second farm milked 12 cows and grew vegetables to be sold in the farm shop alongside the dairy products. Both farmers had part time second jobs but the farm was the core of their income. The vegetable grower used the moon calendar regularly and had it hanging in his kitchen. He would store potatoes and carrots through the winter, selling the produce that was harvested on a good moon day last as it would have kept better.

Fig.9 Silvia and Alfred Schneiter's farm



Photo by (J.Ellis, 2010).

This picture taken in Switzerland gives an idea of the care taken in creating the compost heap. The size and shape of the pile is important as well as the need for the preparation to be applied evenly.

4b. Germany

Farm Visit - Mr. Heinrich Hartiens

The first farm that I visited in Germany was that of Mr Heinrich Hartjens, who was farming 105 hectares biodynamically. 35 hectares was actually in East Germany, 200 kilometres away, which he purchased when the Berlin wall came down. He was a conventional farmer who converted to organic in 1980 and then went biodynamic becoming a member of Demeter in 1998. Demeter is the governing body of biodynamic farming throughout the world.

The main crops grown were winter rye and wheat but peas, potatoes and spring oat were also grown. Heinrich also kept 20 Limousine cattle on a purely grass ration. All produce was sold through a biodynamic co-operative; with a large proportion of the cereals going to feed biodynamic chicken. Heinrich would expect to see yields of 3-4 tonnes per hectare for the cereals with most of it being sold pre harvest, usually achieving double the price of equivalent conventional. The land in East Germany was farmed by the neighbour and Heinrich only visited the farm 3-5 times a year, mainly to apply the biodynamic preparations. The land was very flat, of good quality with an annual rainfall of 700–800mm. Since becoming biodynamic he is convinced that the land is in better “heart”, with more fauna and flora. When I questioned the weed population there was no denying that he has more weeds now than previously, but he doesn’t see them to be a problem. And being surrounded by cropping land his conventional neighbours don’t have an issue with weed seed drift. His 20 cattle were kept simply on a grass and hay ration and rarely needed the services of a vet.

The atmosphere on the farm at the time of my visit was very relaxed and it was obvious that Heinrich was at one with his farm. He used the moon calendar and showed me his copy which was kept in the office. He had made notes about when he had planted various crops and when he would ideally plant the next.

Preparations were a big part of his farming as there wasn’t a sufficient amount of FYM or compost available, so he was rigorous with his application of the appropriate preparations.

My Observations

This farm was very well kept with crops looking in good health showing signs of good yields and a very relaxed yet thorough approach to the work.

Second Farm Visit in Germany: Mr Schloss Hamborn

The next farm I visited was Schloss Hamborn's farm. This was a farm of 374 hectares 150 of which was forest, 54ha grass and the rest was used for arable crops. There was a milking herd of 50 Friesian x DSN. The cows were producing 6400 litres at 4% fat and 3.4% protein. The milk was piped straight to the on-farm dairy where a large proportion of the product was made into cheese and sold through the farm shop, plus a mobile shop which visited local towns and markets.

The cows were fed grass, hay and a small amount of silage and 2 kilos of a barley/rye/bean mix in the early part of their lactation. The farm was seriously looking into investing in a new hay drying facility so that less of the preserved grass would need to be made into silage; raw milk produced from silage is harder to make into cheese when the milk has not been pasteurised first.

There was a strict rotation for the arable land, 3 years of Lucerne and one year apiece for wheat, barley, spelt, red clover, rye, oats and winter barley. None of the arable land was ploughed it was all on a mintill system. The farm has its own bakery which uses 55 tonnes of the grain produced on the farm. The produce of the bakery was also sold through the farm shop and mobile shop. The farm was a social farm and was owned by the community. It employed 25 staff.

Preparations were very important on this farm. Preparation 500 was applied through nozzles which were mounted onto windscreen wiper motors. This device had been developed by the farm and at 3 bar pressure they could get their 12metre sprayer to cover 24metres. The same sprayer had another spray line with specific nozzles to apply preparation 501

My Observations

The farming was of an extremely high standard both of livestock and crops and the farm was well equipped with buildings and machinery.

The future looked healthy although it became apparent that there was some tension between the farm and the community.

The community felt that the farm was spending too much money on machinery and equipment while at the same time charging too much for the produce in the shop.

Third Farm Visit to Germany: Mr. Hoff Dannwisch

The third farm I visited in Germany was Mr. Hoff Dannwisch's. This was a farm of 160 hectares, 95 of which was cropped, 3 hectares was forest and the rest was grass for the 40 milking cows. Enterprises on the farm included a market garden, cheese factory, pigs, chickens, farm shop, vegetable box delivery scheme and a kindergarten.

The farm was another community farm which was run by 5 families who provided some of the 9 directors. The farm employed 50 people either part or full time. The farm has been biodynamic for 50 years during which time it has steadily grown both in size and in enterprises.

Cereals were drilled at 22cm rows, this would allow for them to be hoed in the spring and also weather permitting a pass with a tined rake as soon as possible after the crop had established. The rotation was 2 years clover and grass, wheat, then one year of vegetables, 2 years of rye / wheat, vegetables, and then oats and clover. Planting would be done when possible by the moon and in particular hoeing and raking would be carried out on "fruit" days.

The farm was famous through Europe for its long established biodynamic history and also its cheese, which gained many awards. Tobias the cheese maker insisted the success of his cheese was due to the quality of the milk. Milk would be tested bi-monthly and on numerous occasions bacteria scan would be so low that it would be undetectable. Cell count was running at 120,000

My Observations

The farm was very busy with a lot of people of all abilities. It was obvious that the farm was engaging with the public and regularly hosted schools either for a day or on a short study vacation, with large dormitories built to cope with such events. I questioned - with so many families involved and a large number of staff - how difficult it was to manage them all and how well everybody got on with each other. Tobias informed me that about once every 2 months a social adviser comes and speaks to the people trying to iron out any problems that may be present.

4c. Luxembourg

First Visit in Luxembourg: Messrs Shank

In Luxembourg I visited Ander Shank who was the chairman of Oikopolis. Oikopolis is a co-operative owned by 35 farms who supply organic and biodynamic produce to 6 shops and 2 restaurants plus supermarkets and other wholesale outlets.

There are 60 organic farms in Luxembourg, 10 of which are biodynamic. Out of a total of 2000 farms in the country the conversion rate is currently 1-3 farms per year going organic/ biodynamic. The country is keen to support converting farms and offers an extra year of funding on top of the standard 2 years of funding from Europe.

I visited Ander Shanks's brother's biodynamic farm of 120 hectares where he milked 45 cows producing on average 6000 litres per year with 3.5% protein and 4.3% butterfat. The farm had been biodynamic for 30 years and as with lots of the other farms was currently investing heavily in new hay drying facilities. They were convinced that well preserved hay was a far superior feed to silage. The farm had a farm shop which only opened one day a week. Mr Anders planted by the moon but was insistent that weather and soil conditions were more important than the phase of the moon.

A recent study carried out by Oikopolis revealed that people are currently consuming 1-2000kg of dry matter per year but in fact only need 7-800 kg. Organic/biodynamic land will produce 4-5000 kg of dm per year. Luxembourg has 130,000 ha of agricultural land; at 4 tons of dry matter/hectare farmed organically this could sustain 520 000 people eating 1 tonne of dry matter/year. This is 4% more than the current population, evidence to suggest that farming with the moon as part of biodynamic/organic could provide sufficient food.

My Observations

This was a busy farm with family members working hard. The crops and livestock looked extremely well and it was noticeable that there were very few weeds present.



Fig 10. Preparation mixing equipment on farm in Luxembourg

Here you can see the preparation mixing equipment of a farm in Luxembourg. The two mixing vessels on the right were equipped with automatic mixing devices. This made the preparation making process a lot easier although the method was frowned upon by some biodynamic farmers as it was thought that human effort (as opposed to using mechanical means) was a very important part of the preparations



Fig 9 The type of cow that I saw on my travels: a very dual purpose animal.

4d. Italy

Farm visit in Italy: Fattoria di Vaira

I visited Fattoria di Vaira a farm of 500 hectares. The farm had 100 milking cows with 300 cattle altogether, 70 milking goats, 100 pigs, 100 hectares of vegetables - 16 hectares of which was winter vegetables - also vines and olives. The farm had recently become a community farm with 40 shareholders, which included individual people and organisations. With its own shop and dairy making cheese, this farm needed a large number of staff and had 40 workers altogether. With very heavy soil and a low rainfall of 600mm it was obvious that the land was very difficult to work, and at the time of my visit there were cracks in the field so large that I could get my hand down them past my wrist. The moon calendar was used when possible but this farm had only just finished its biodynamic conversion so was still finding out and learning biodynamic ways.

My Observations

It was clear that biodynamic was new to this farm with staff trying to adapt to the new technique. They were willing to farm biodynamically, however, as they felt their future was more secure by using this method.

This seemed to be very difficult land to cultivate. That, combined with the climate, made conditions very different to what I had experienced in other countries.



Fig.11: Although this farm in Italy used the moon calendar, soil conditions and weather often dictated when activities took place

4e. Canada

First Farm visit in Canada: the Schmitts

In Canada I visited Marcus Schmitt and his father Michael, who farm 400 acres keeping horses, pigs and 40 milking cows (Canadien/Jersey cross cows). 200 acres of the farm was tillable and they cropped about 40 acres a year for cereals, which was either sold or used to feed the pigs. They had a farm shop which opened once a week on Fridays, cheese making facilities and a delivery into Toronto once a week.

Michael was famous in Canada for his determination to sell raw (unpasteurised) milk, which is currently against Canadian law. In order to continue to supply unpasteurised milk to his loyal customers without breaking the law each customer must buy a cow share, which is \$2000 for a quarter of a cow. The milk and dairy products, bread and other seasonal produce are loaded onto a bus which makes the 2.5 hour journey to Toronto where only shareholding customers can purchase the goods. At the time of my visit 2 litres of milk were being sold for \$6, which equated to £2 per litre. The bus would on average bring in around \$5000 a week and the shop \$2000. A battle with the government some time ago cost the farm dearly, resulting in the loss of around 600 acres and the cheese making equipment. In protest Michael starved himself for a month imbibing just one glass of the farm's milk a day. The lengthy battle prompted the farm to start the cow share scheme.

Cows were fed only grass and hay and, instead of feed troughs in the parlour, there was a drinking trough and, on some days, the cows' only access to water would be at milking time. At certain times of the year cider apple vinegar would be added to the water as an aid against retained afterbirths. Imports to the farm were kept to a strict minimum and the cows' mineral supplements were made from dried hedgerow trimmings which were chipped and crushed.

My Observations

Visiting the farm it was clear that the family and their customers were strong believers in the benefits of biodynamic farming both for the environment and for the health of those who consumed the produce.. The cows, despite being on a simple plain diet, were looking extremely well and Marcus was focussing on breeding this cross bred animal that he felt best suited their system. As with most farms that I visited the young stock were looking well and the calves were kept on milk for 6 months before weaning.

The farm had 4-5 members of staff some of whom worked simply for experience and their board and lodging. It tried to keep its environmental impact to a minimum. Inputs that could not be sourced from the farm were sourced locally e.g. wood for a new barn was being sourced from a local Amish sawmill, chicken feed was being made from dried vegetation in a homemade mobile solar dryer and horses were used instead of tractors where possible.

The farm had its own vegetable plot for producing vegetables for their own and their customers' consumption. Whenever possible seed planting followed the moon calendar, weather and soil conditions permitting.

The Schmitts have a long association with biodynamic farming, Marcus's great grandfather being one of the farmers who inspired Rudolf Steiner to give his original agricultural lecture.

Second Farm visit in Canada: Ulrich Hack

I then visited Ulrich Hack (pictured below), who farmed 900 acres biodynamically. 200 acres of this was grass to feed his 70 beef cattle.

There was a strict rotation of 2 years of clover, and then one year apiece of millet, spelt, rye, soya bean, wheat and then maize. Most cereals would be undersown with a clover which could be left after harvest to produce nitrogen and plough under as a green manure for the next crop in the spring. Ulrich felt the preparations were more important than planting with the moon. He would always apply preparation 500 and the compost preparation together, and then preparation 501 with horse tail preparation. Grass fields for cutting were a mixture of meadow grass (Cocksfoot), with red and white clover, alfalfa and trefoil.

My Observations

This farmer was very confident and knowledgeable about his method of farming. This was clearly apparent in his crops.

However, despite being very busy he still highlighted the importance of prioritising the family in relation to the farm.



Fig 12. Marcus and Michael's produce was taken by bus to Toronto



Fig 14: Myself talking to Marcus and Ulrich Hack

Third Farm visit in Canada: 20 acre horticultural farm

The third farm I visited in Canada was a 20 acre horticultural farm producing vegetables and a few Highland cattle.

The land was quite heavy and sticky which made following the moon calendar difficult in some weather conditions but he always tried when he could to plant and harvest by the moon in his poly tunnels. Heavy feeding vegetables were always followed by light feeders and clover being white or yellow was usually sown between the rows to make nitrogen, suppress weed growth and retain soil moisture. This small farm had 4 workers some of which were volunteers purely helping for the experience and to gain knowledge in biodynamic.

My Observations

I feel that the two pictures below summarise very well what I saw and experienced in my travels: animals and crops that were looking extremely healthy, on a low input and low environmental impact farming system.



Fig 15 : Winter Rye on Ulrich Hack's farm and Fig 16 (below) Canadien cattle at Glencolton Farms



4d. Summary of all farms visited

The following table is a simple reference showing the basic properties of each farm

Farm	Size	Crops	Livestock	Processing	Staff
Hans Bigler Worb Dorf	13ha	Potatoes	20 beef		1.5
Silvia and Alfred Schneider	13ha	Vegetables and rye	20milking cows, 2 horses, 5 pigs	Milk bread and vegetables sold in farm shop	3
Heinrich Hartjens	105ha	Winter rye, spring oats, wheat, peas and potatoes	20 beef	Produce sold through biodynamic co-operative	1.5
Schloss Hamborn	373ha	Forest, lucerne, wheat, spring barley, spelt, red clover, rye, oats winter barley and beans	50 milking cows, 30 pigs	Bakery, cheese factory, produce sold through a village shop and mobile shop	Full time 12 Part time 13
Hof Dannwisch	160ha	Wheat, rye, spelt, peas, oats and vegetables	45 milking cows, 50 pigs and chickens	Bakery, cheese factory, kindergarten, delivery box scheme	Full time 25 Part time 25
Ander Shanck	120ha	Potatoes, barley and rye	45 milking cows	Farm shop and a member of a biodynamic co- operative	5
Fattoria di Vaira	500ha	Vegetables, wheat, barley, oats, spelt, lupins, alf alfa, sorgum, maize, vines, olives and various fruits	100 milking cows, 70 milking goats and 100 pigs	Cheese and farm shop and sold to biodynamic co-operative shops	40
Glencolton Farms	160ha	Barley, wheat and rye	40 milking cows, 20 pigs, 10 horses	Cheese and bread sold along with raw milk direct to share holding customs	6
Ulrich Hack	360ha	Clover, millet, spelt, rye, soya bean, wheat and maize	70 beef	Produce sold through biodynamic co-operative	3

As you can see from the table above the farms that I visited varied greatly, both in size and activities, but there are two common similarities. The first is that they all had cows, whether for beef or milk. The cow is considered a very important part of biodynamic farming, due to the way in which she digests her feed and turns it into manure. The importance of this is highlighted in a part of Steiner's agricultural lectures.: (see over)

“What is farm yard manure? It is what entered as outer food into the animal, and was received and assimilated by the organism up to a certain point. It gave occasion for the development of dynamic forces and influences in the organism, but it was not primarily used to enrich the organism with material substance. On the contrary, it was excreted.” (Steiner 1924).

Steiner insisted that the manure carries forces from within the cow's stomach out into the open air. He describes these forces as astral (connected to the stars) and ethereal (heavenly). It is these forces that have life giving properties and by giving these forces back to the soil we are completing the cycle.

The second similarity between all the farms is the large number of people and families dependent on the farm. Five out of these 9 farms were social farms, meaning that they are jointly owned and/or worked by many people who could be directors or shareholders in the business. This seemed to work well with everybody having a clear understanding of their position and role within the farm. On most farms all the staff and senior persons ate together at least once a day. This gave everybody a chance to network and keep up to speed about what was happening on the whole farm. I was amazed how well everybody seemed to get on and questioned how such harmony could happen.

To my knowledge Steiner does not make any direct indication that biodynamic farming needs a large work force. But obviously being organic there is a understanding that this method uses more man hours. The more people on the farm the more life and variety will be present and I refer back to "bio" meaning life and organisms and "dynamic" referring to variety.

5. Scientific evidence to support my observations

From visiting these biodynamic farms I could see the physical results obtained from farming by this method, but I needed to find some scientific evidence to back up my observations. I turned to the work of Ulf Abele and Nick Kollerstrom both of whom have experimented with planting with the moon.

First I have two graphs showing Ulf Abele's barley trial in 1970 and his oats trial in 1971. You can see he planted these crops over a one month period. The horizontal axis indicates the day and the vertical axis indicates the yield of the crop at harvest whilst the dotted vertical lines indicate fruit days. As you can see there is a clear increase in yield for both crops on fruit days. These two trials showed a mean yield excess of 7% on fruit days, (*Kollerstrom and Staudenmaier, 2001*).

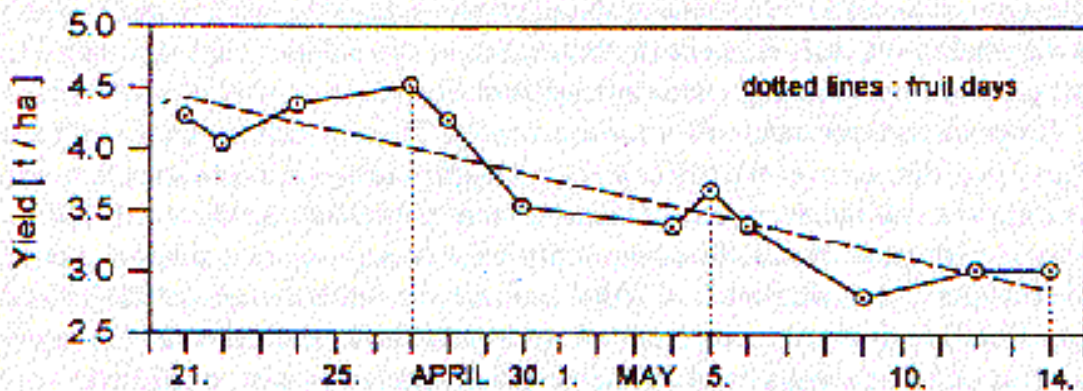


FIGURE 1. Abele, Barley 1970.

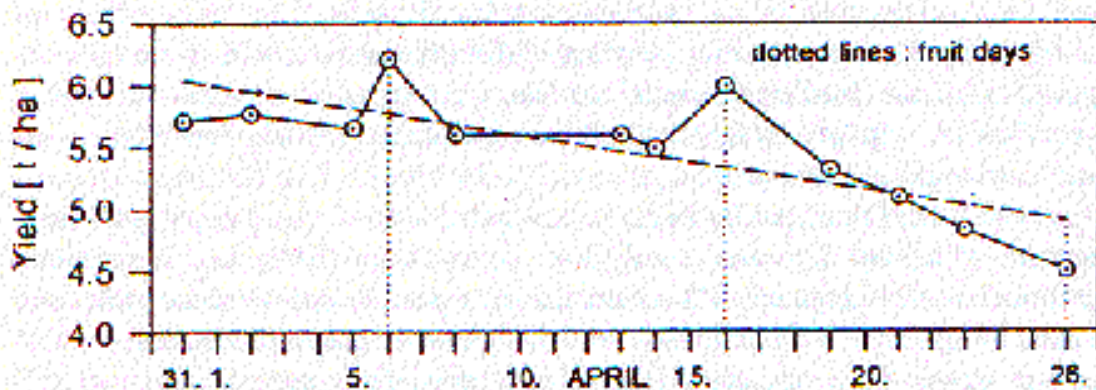


FIGURE 2. Abele, Oats 1971.

The following two graphs show Abele's trials for carrots in 1972 and radishes in 1974. The dotted vertical line now indicates root days. Here again you can clearly see an increase in crop yield when planted on root days. These two trials averaged an excess of 21% on these days above the mean yield, (Kollerstrom and Staudenmaier, 2001).

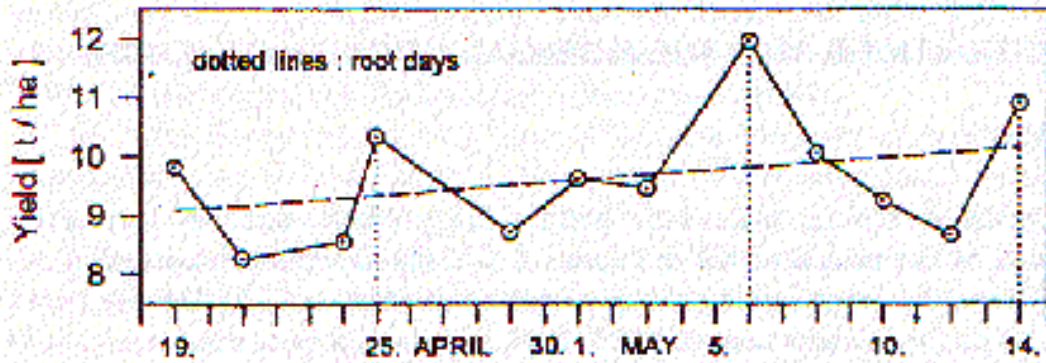


FIGURE 3. Abele, Carrots 1972.

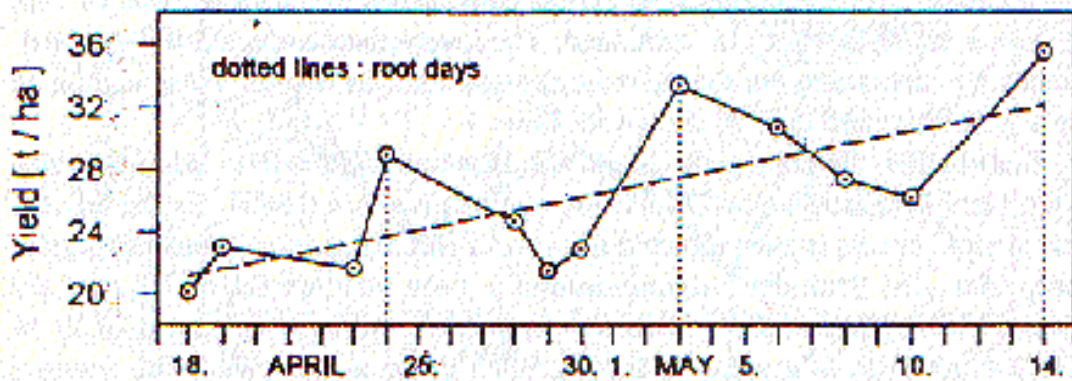


FIGURE 4. Abele, Radish 1974.

This graph below shows a trial conducted by Nick Kollerstrom in 1976, he planted 24 rows of potatoes over 2 months on a farm in Sussex this trial showed yield maxima for the root day plantings. Their mean yield were 30% in excess of plantings on other days

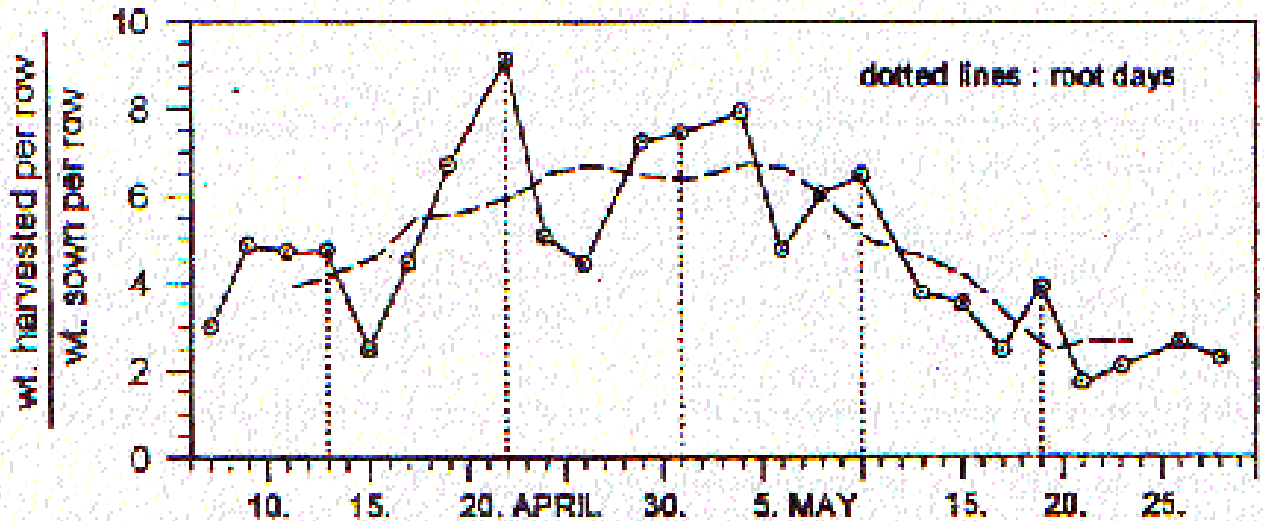


FIGURE 5. Murriz/Kollerstrom, Potatoes 1976.

I became disappointed with the lack of evidence or the difficulty in sourcing it to support my study, particularly in regard to the effects of the moon on farm animals. So I took some figures from our own herd of Guernsey cows to see if the moon has any impact.

Firstly I took the heat detection figures to see if there is any difference between the numbers of heats detected during a full moon as opposed to a new moon. I used a period of 5 days, the day of the new/full moon plus the previous and following 2 days.

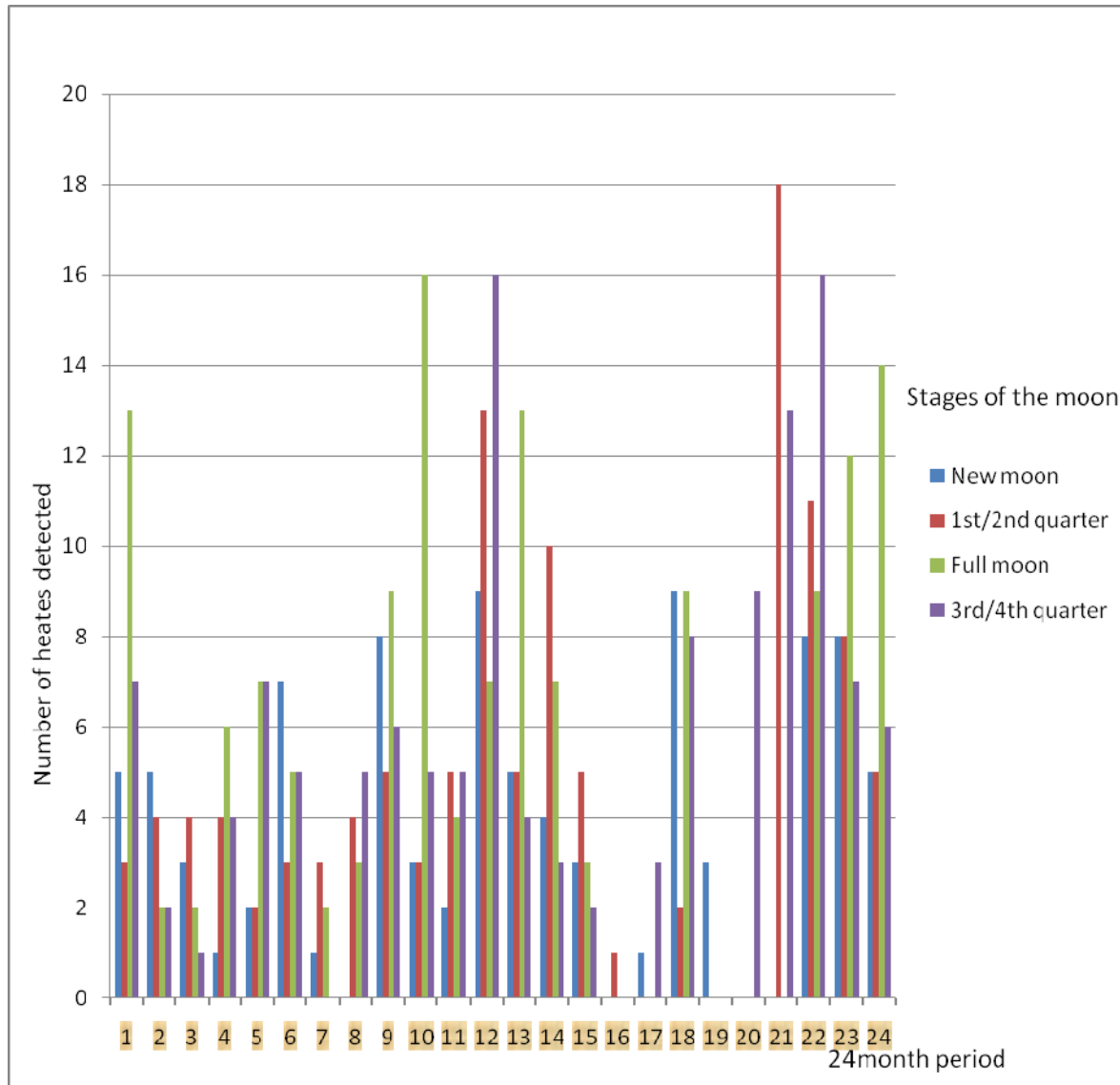
The table on the next page indicates the heats detected over a 24 month period from the 01/01/08 to the 31/12/09.

Fig.23 : Heats detected over a 24-month period from 1.1.08 to 31.12.09 in my own herd

Month/cycle	New moon	1 st /2 nd quarter	Full moon	3 rd /4 th quarter
1	5	3	13	7
2	5	4	2	2
3	3	4	2	1
4	1	4	6	4
5	2	2	7	7
6	7	3	5	5
7	1	3	2	0
8	0	4	3	5
9	8	5	9	6
10	3	3	16	5
11	2	5	4	5
12	9	13	7	16
13	5	5	13	4
14	4	10	7	3
15	3	5	3	2
16	0	1	0	0
17	1	0	0	3
18	9	2	9	8
19	3	0	0	0
20	0	0	0	9
21	0	18	0	13
22	8	11	9	16
23	8	8	12	7
24	5	5	14	6
Total	92	118	143	134
Average	122	122	122	122

The table above has been put into a graph for easy reference, see following page.

Fig.24: Graph to show number of heats detected in cows over a 24 month period at stages of the moon



As this table indicates there is an obvious difference between the numbers of heats seen during these periods.

The 92 heats detected during a new moon is 24% lower than the average number of heats detected - 122. The 143 heats during the full moon is 17% higher than the average. These figures indicate that the moon is influencing the bulling behaviour of our cattle or the heats are more noticeable during a full moon.

The following table indicates the number of cows served during the new and full moon compared to the actual calving from those services to determine whether the conception rate was different during these two periods.

Fig.25

NEW MOON		FULL MOON	
No cows served	No cows conceived	No cows served	No cows conceived
4	2	6	2
3	0	5	0
5	2	3	2
3	0	9	3
11	3	12	5
7	2	12	3
Total	Total	Total	Total
33	9	47	15

The figures for the new moon show a conception rate of 27% and for the full moon 32%. This gives us an 18% better conception rate during a full moon.

As you can see, according to my data gathered at Boscarne farm, it does seem as though the moon is affecting cattle behaviour.

I now turned to the work of Malcom Gibb (*see figure 26 on next page*).

The first figure shows a theoretical grazing activity curve.

Figure B shows the grazing activity of the studied dairy cows during a full moon. Each bar indicates the number of minutes spent grazing in each hour.

Figure C shows the cows' grazing activity during a new moon is reduced, particularly during the dark phase from 2100 to 0400

Fig 26 - See next page

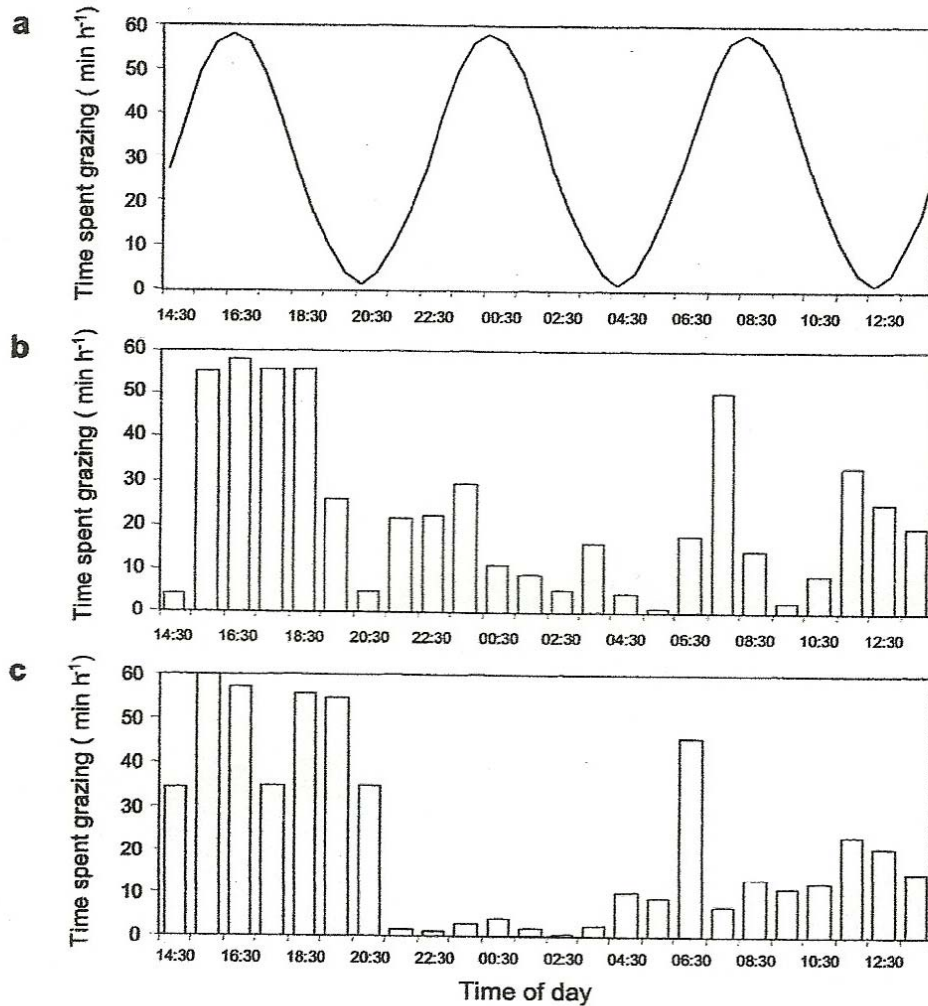


Figure 13. (a) Schematic representation of 8-hourly cycle of peak grazing activity and actual time spent grazing during each hour of the day by dairy cows grazing (b) during a period of a full moon phase and (c) new moon phase. Cows were removed for milking at 14.30 and 05:30 h. (Gibb et al. in press)

So I now know that the moon does seem to affect cows and their behaviour but does it affect milk production? I have used Dairy Co's milk production figures for the 09/10 quota year and plotted the full and new moon on the chart to see if there is a pattern.

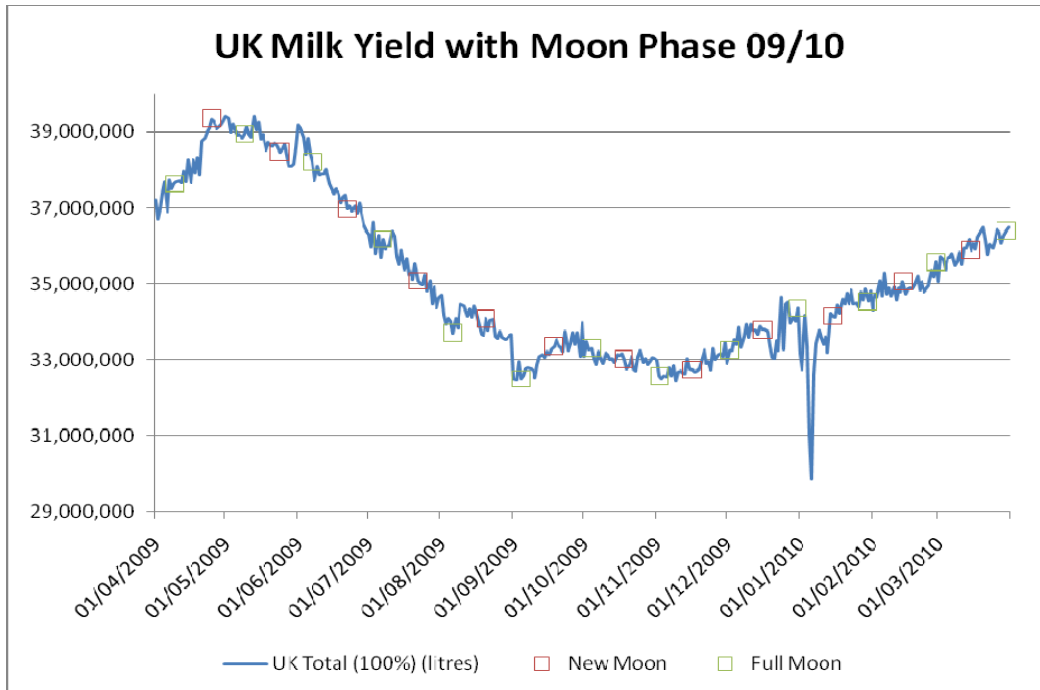


Fig.27: Dairy Co's milk production figures for UK.

This first graph shows the milk deliveries for the 09/10 quota year it would seem that milk production takes a dip around the full moon particularly in the summer months. This could be because cows are showing stronger heats around a full moon and therefore giving less milk. The pattern could be more noticeable during the summer as they are outside grazing and are more influenced by the light of the moon than in the winter when they are under artificial light.

See further Dairy Co graphs on next page

The following graphs (below), give a more detailed breakdown of milk deliveries, showing 3 months at a time. Although this evidence is not conclusive I do think it is of interest.

Fig.28 : figures from Dairy Co, relating to First Quarter

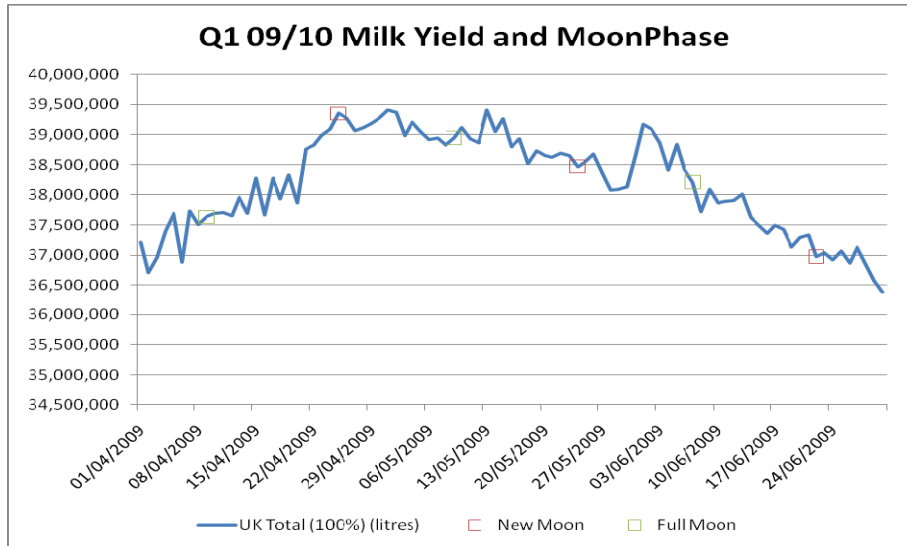
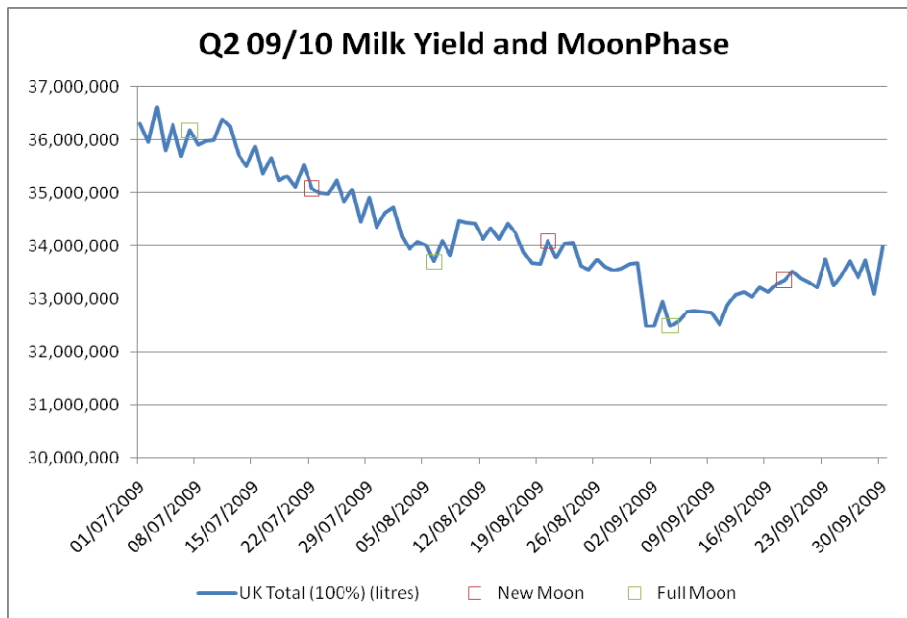


Fig 29 : figures from Dairy Co, relating to Second Quarter



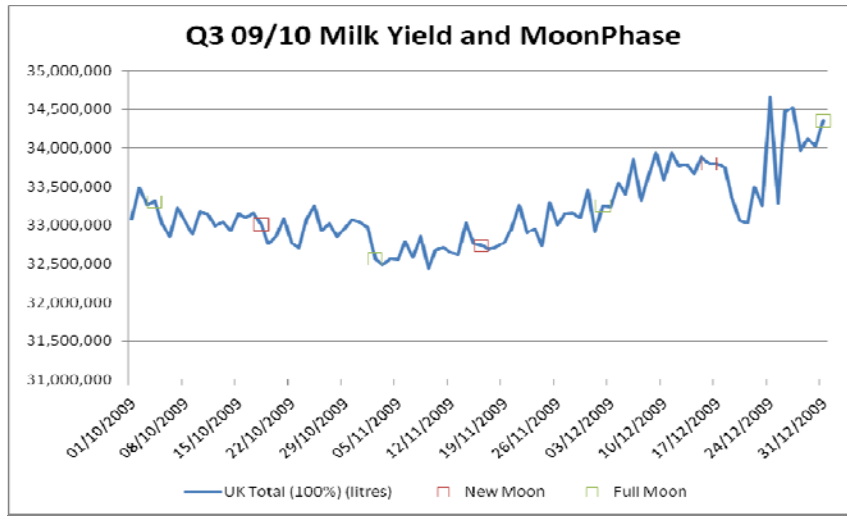


Fig.30 - above. Dairy Co figures relating to Third Quarter

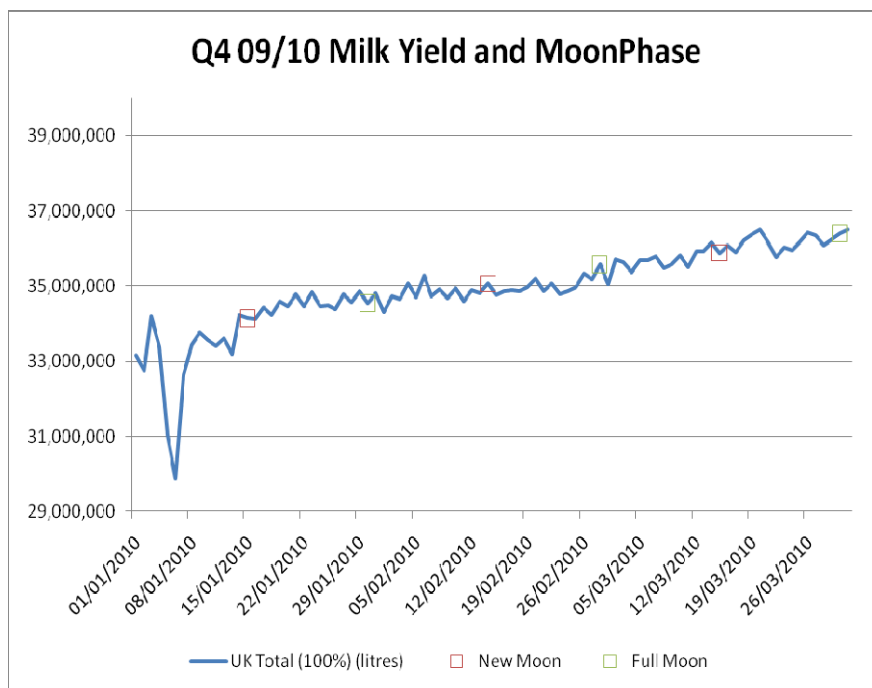


Fig.31 - above. Dairy Co's figures relating to Fourth Quarter

6. My Own Interpretation

From all the data I have gathered, there does seem to be a link with the cycles of the moon and optimum outputs. Unfortunately lots of this data was not gathered specifically for my report; however this could be a good point as it gives a true picture of the influences without eliminating any of the variables.

Some variables that I think may have had influencing factors in the data include:

- Weather
- Temperature
- Seasons
- Soil conditions
- Photo period / photosynthesis
- Humans and human error
- Location
- pH
- varieties of crops / animals

To discuss these variables:

Weather

The weather, temperature and ultimately the seasons have a connected influence on plant growth. The data gathered relating to crops was to my knowledge collected in uncontrolled weather conditions. Possibly, to have a more accurate set of data, these trials need to be carried out in a poly tunnel or similar environment where some of the variables can be controlled: such as light, temperature, humidity and wind. However obviously some of the variables such as seasons would be very difficult to control.

The data collected relating to the cows was collected in natural uncontrolled conditions. A more accurate set of data could be collected from a herd of cows which are kept in a more constant environment where temperature, ventilation and light would be controlled, but would this barrier between the animals and the moon influence the moon's impact?

Soil conditions

Soil conditions can obviously vary greatly throughout the year from field to field and on every farm. These variations can depend on many things but some examples are as follows: soil composition, mineral and organic material content values, soil fertility and humus content. The pH levels can also vary within different parts of a field. To eliminate soil variability would be difficult.

Humans

Obviously when gathering data there is always, unfortunately, an element of human error, whether this is when data is collected or interpreted. An example of how data could be gathered incorrectly for this report could be my results gathered when detecting cows on heat. More than one person was carrying out heat detection within our dairy herd, which unfortunately could lead to personal interpretation and variation within the data. This could be made more accurate if the same set of people - or only one person - was to carry out heat detection in cows.

Location

The effects of the moon are said to be more noticeable as you get closer to the equator. This would also have a relationship to the photo period.(hours of daylight). For my data to be more accurate a central location could be used in the UK to collect data, or a comparative look at several different locations

Varieties of crops /animals

We should presume that there could be a variance in the individual breeds or varieties in relation to the effects of the moon. For the data to be more accurate this variable could be eliminated.

I have identified these variables and there are probably many more but I need to remind myself of my study title: "Is there a role for farming by the cycles of the moon in UK agriculture".

To control these variables would be impractical or impossible so for the benefit of my study I feel it is good that these factors have not been removed as it gives a realistic picture of its relevance to UK agriculture

7. Conclusions

1. Finding physical evidence showing the influences of the moon has been difficult and therefore proving that planting and harvesting by the moon has benefits is also very difficult. But visiting the biodynamic farms that I have has been first hand evidence that this combined method of farming using organic methods, homeopathy and the moon cycles does produce some extremely satisfying results.
2. I strongly believe from my research so far that farming by the cycles of the moon should have a role in the future of UK agriculture. This method of farming has less impact on the environment and is more sustainable due to the lower amount of fossil fuels consumed.
3. The influences of the moon may be small but significant enough so that every farmer should understand the influence of the moon on animals, soil, plants and the water table. This applies especially to those who are farming organically, as it is considered that organic soil has more living organisms which can be influenced by the moon. In a world of rising fuel prices this method of farming has a positive future and using the moon to aid the growth of the plant, getting it off to a good start and harvesting it at the best time has to be beneficial .
4. As a result of my study I am very keen to make moves towards farming in a more sustainable way and over time hopefully moving towards biodynamics. There are many principles that I have seen on my travels that can be applied to conventional farming.
5. I have also been inspired to have another look at selling produce direct to the consumer after visiting Michael and Marcus Schmitt in Canada.

8. Summary of Essential Points

- Farming by the moon is used mainly as part of biodynamic farming techniques.
- Weather and soil conditions are the primary factor in establishing a crop in addition to being aided by the appropriate cycle of the moon
- To farm accurately by the moon you need to use a lunar calendar
- It could be beneficial to estramate cattle 2-3 days before a full moon to obtain the best conception rate
- The influences of the moon are more prominent on organic soils than conventional
- Applying manure would be more beneficial on a waning moon as more nutrients would be taken in by the soil reducing the risk of pollution from nitrate run off

I intend to use and experiment with the knowledge I have gained, to improve our business and to encourage others to realise the relevance of the moon.

“In the end there is really nothing more important than taking care of the earth and letting it take care of you”. (Charles Scott)

9. Acknowledgments

Nuffield Farming Scholarships Trust for the opportunity to study my topic in various parts of the world, to gain a better understanding of farming by the moon and Biodynamics, and the chance to meet some very interesting people.

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And most importantly to Sam Wells my fiancée for allowing me to take up this challenge, helping me with my Travel arrangements, the report and being understanding when I was a little preoccupied with the Moon.

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