Partner Farms; experiences with livestock farming system research to support intersectoral cooperation

J. de Wit, U. Prins & T. Baars
Louis Bolk Instituut, Hoofdstraat 24, 3972 LA Driebergen, The Netherlands

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Summary

For more than five years, the Louis Bolk Institute has been developing Partner Farms in cooperation with a growing number of, now more than 50, organic farmers. The Partner Farm concept, mixed farming at a distance, is aiming at the utilization of several advantages of mixed farming while retaining the farmer's autonomy and specialized farm structure. While farming in the Netherlands is highly specialized, increased intersectoral cooperation is essential in organic agriculture as legislation concerning the use of inputs of non-organic origin is tightening. Experiences of the participatory action research developing the Partner Farm concept are summarized, particularly relating to the exchange value of organic manure and grass-clover production.

It is shown that Partner Farms are a viable possibility to increase intersectoral cooperation, particularly exchanging grass-clover as ruminant feed from arable farms with increasing amounts of animal manure from livestock farms. Organic concentrate production at arable farms in the Netherlands is hardly an option due to the low economic returns incurred, thus leaving organic pig and poultry farms little options than producing animal manure mainly on imported feed.

During the action research various development concepts emerged such as grass-clover derived N as a realistic alternative to the limitedly available manure-derived N, and animal manure being hardly used on grassland but mainly on arable land. These development concepts were not merely devised but technical, economical, practical and ethical implications were explored, thus producing results that are not only technically sound but also acceptable and applicable in organic agriculture. This was possible due to the simultaneous use of various research techniques in which farmers were closely involved in all stages of the research.

Keywords: participatory research, organic, mixed farming, grass-clover, manure

Introduction

Mixed farming has several advantages e.g. closing nutrient cycles, widening crop rotations (Oomen et al. 1998; Van Keulen et al., 1998) but also reliability and tractability of input supply. Despite these advantages, agriculture in the Netherlands, as in many West-European countries, is highly specialized. In conventional farming this specialisation has lead to narrow crop rotations with high use of external inputs of fertilizers, biocides and feedstuffs. In organic agriculture specialization is problematic as the utilization of non-certified organic inputs is increasingly restricted (see Anon., 1991). This legislative trend towards closing (nutrient) cycles originates partly from image problems if the organic sector continues to

grow on large inputs of manure and concentrate of non-organic origin. This tightening legislation necessitates increased intersectoral cooperation at some level in order to meet e.g. the manure demands of arable farmers and concentrate demands of livestock farmers. Intersectoral cooperation is possible at various levels:

- the mixed farm.
- mixing independent farm enterprises at one location.
- cooperation between independent farms at different locations.
- free market exchange.

Possibilities for mixing specialized farms at one location are limited in the Netherlands due to regional specialization (partly related to soil characteristics), high costs to obtain production quota which are required for the main agricultural products and social obstacles incurred (the tradition of 'individualistic farmers'). Examples of (re)mixing are available in the Netherlands, e.g. independent vegetable farmers using 1/7 of the crop rotation of arable and mixed farms. Other examples concern dairy farms with sufficient land starting wheat and/or potato growing but these remain exceptions.

Direct trade between independent farms at different locations is an important option to obtain the necessary inputs, as markets of organic inputs like manure, feed and bedding material are small and not transparent. If farmers are willing to make long term arrangements and adjust e.g. crop rotation, manure application practice and feed ration, they are starting to act as Partner Farms, in which management, financial and legal liabilities remains separate but cooperation becomes a major feature.

Since 1996 the Louis Bolk Institute is involved in action research together with an increasing number of organic Partner Farms who are aiming at utilizing some of the advantages of mixed farming while retaining their autonomy (Nauta et al., 1999). In several research projects the contact between arable and livestock farmers was stimulated by e.g. group meetings and regional lists with supply and demand of inputs. Simultaneously, various key problems of organic production under tightening regulation were tackled, for example:

- On farm experiments with e.g. the introduction of clover in grassland, crop production with reduced manure application and the utilization of grass-clover and alfalfa in arable crop rotations.
- Experiential science: actions and experiences of Partner Farms were recorded, analysed and discussed with the farmers. In combination with the on-farm trials, farmer and researcher were often each other's counterpart in a mutual research undertaking (Baars, 2002).
- Desk-study on e.g. opportunity costs of manure, cost price of possible feed crops at arable farms and the identification of bottlenecks in the provision of organic inputs.

Grass clover as N-producer and the exchange value of manure

Primary research theme was the management of grass-clover. The importance of legumes as source of nitrogen for organic agriculture is recognized for long. Many experiences indicate that, with the modern large-leaved varieties of white clover available, it is possible to have sufficient high clover densities in nearly all types of grassland in the Netherlands if clover management and soil fertility is adequate (particularly crucial are potassium availability on sandy soils and phosphate on clay soils). Moreover, it is shown that grassland production is only marginally affected by reduced N-fertilization if sufficient clover is present (for on station experiments validating these experiences see Baars, 2002; Schils et al., 1999), while increased soil-N pools can be used by subsequent arable crops (Van Eekeren & Van Liere, 2001; Van Eekeren et al., 2002).

Thus, legume-derived N could be a realistic alternative to the limitedly available manure-derived N in organic agriculture. Desk study indicate that current livestock management practices and average livestock density at organic land in the Netherlands result in an availability of collected organic manure representing only ± 65 kg N (De Wit & Prins, 2002), implying highly reduced manure application levels if the utilization of non-organic manure is banned[1].

During the participatory research activities a concept emerged in which a large proportion of the collected manure is used in arable production while livestock farms use hardly any besides the non-collected manure droppings during grazing, and sustain their soil fertility with other certified sources such as clean compost. At present however, a relatively small portion of the collected organic manure is used in arable production, just sufficient to attain the level of 20% of the applied manure at arable farms, as being prescribed in the Netherlands. Desk calculations and subsequent group discussions with farmers indicate that this might be due to alternative sources of N (particularly vinass of non-organic origin) that are (still) allowed in organic agriculture. The relatively low costs of these inputs (<€1,- per kg N) reduce the "willingness-to-pay" of arable farmers for manure to levels that are insufficient to meet the demand of livestock farmers (on average >€9 per ton slurry containing less than 4 kg N; this includes average transportation and application costs of € 7,50). General opinion among organic farmers is that this situation will change significantly only if regulations on the use of organic inputs are tightened and product prices are increased, as the cost of organic production will seriously increase by banning non-certified inputs.

Feed production at arable farms

Another priority in the action research was the production of animal feed at arable farms. Desk study indicate that the production of feed is generally unattractive for arable farmers as cost of production and transportation often exceeds €180 per ton dry matter for silage maize and € 250 for concentrate-likes. These cost prices are often higher than the maximum price livestock farmers are willing to pay as the market price of organic feed grain is around € 230 per ton. Main exception to this general picture is the production of grass-clover. Most dairy cattle and goat farmers indicate a level of € 150 per ton dry matter as maximum acceptable price of good grass-clover silage. For arable farmers this results in an unattractive return on land (excluding subsidies) close to zero. However, an increasing number of organic arable farmers are willing to accept this because the production of grass-clover implies several benefits which are highly valued by arable farmers, e.g. N-fixation, organic matter production and weed suppression.

Actual cropping patterns support these indications as little organic concentrate ingredients and silage maize is grown within the Netherlands, except for farms in conversion to organic farming. During group discussions it revealed that this might even diminish as organic grain production as such is under pressure (due to relatively high weed pressure which is not compensated by favourable margins). Likewise many organic dairy cattle farmers indicate that they tend to decrease the level of concentrate feeding and thus production per animal if concentrate prices rise, a trend which is already visible at present. On the other hand some dairy farms are becoming increasingly interested in producing their own feed grain, being relatively cheap as no manure is required for feed crops after ploughing grass-clover, while grain is an ideal preceding crop for grass-clover renewal.

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[1] Current animal manure application levels are 130-170 kg N per hectare as being close to the maximum level under EEC legislation for organic production.

The role of organic pig and poultry farming within the Partner Farms is almost completely limited to the provision of organic manure to arable farms. The ingredients of organic pig and poultry feed originate increasingly from agro-industrial processing (e.g. whey) but are still mainly imported grain and legumes. This situation is unlikely to change dramatically as pig and poultry feed production on arable land in the Netherlands seems too expensive, being more costly than imported feed.

Thus, a development concept emerges with ruminants producing mainly on grass-clover, while the niche for organic pig and poultry farming seems to be limited to the utilization of organic by-products and/or imported feed concentrate ingredients. However, observations of the actual exchange of grass-clover between Partner Farms revealed some unexpected limitations. Firstly, many arable farmers fail to make grass-clover silage that meet the high quality desired by the dairy farmers as they find it hard to choose the proper timing of harvesting. Management support of the livestock farmer to decide for the proper time of cutting is only practical if distance does not exceeds ± ½ hour driving. Secondly, it revealed that chopping is the cheapest harvesting method, even with subsequent large distance transportation of well over 40 km. Such distances often imply transportation by lorries via highways, resulting in an extra party involved (the transportation company) and traffic jams being regular but unpredictable phenomena. As a result logistic management becomes complicated and total costs of silage making and transportation unpredictable, both hampering the cooperation between Partner Farms at large distance.

Research method

During the development of the Partner Farm concept many different research techniques have been applied simultaneously, with emphasis on:

- on-farm activities and experimentation. As also mentioned by Anderson (1992) this is not only because specific management history and ecological conditions are not available on experimental stations (thus given possibilities to test e.g. white clover under various conditions, including those with extreme soil fertility) but also because the effect of innovations on other parts of the (partner) farm are often unexpected and management itself is highly relevant (see the example of grass-clover harvesting). Besides non-replicated trials and the observation of and reflection on innovative actions of farmers (including pattern recognition), replicated experiments were used as research techniques (Baars, 2002).
- group discussions between farmers and researchers involved. These have been important to interpret e.g. the implications of the calculated opportunity costs of manure in relation to the desired development of the regulations on organic agriculture (ethics). The group meetings were also used to facilitate interactive learning and to reflect more thoroughly on (likely) changes in cropping patterns. Besides actual results of the on-farm trials, results of desk studies were often used as input for these discussions. Major phenomenon of these desk studies was that the calculation models are fairly simple, not meant to mimic the whole complexity of real situations but to serve as a tool for generating hypothesises outside the current practice, ready for discussion (see also de Wit et al., 1993). As the interest of policymakers in organic farming and in the Partner Farm concept increased, the need increases to refine these calculations.

The wide range of livestock farming system research techniques used was also essential as:

- interpersonal relations are important (implying the need for an open dialogue and personal involvement of the researchers)

- inter-farm cooperation affects farm layout (implying the need of desk study and the integration of knowledge of many different disciplines).

Strong impression is it is mainly due to the simultaneous and flexible application of all different research techniques, with farmers participating at all stages and in various ways, that results could be produced that are acceptable to and applicable in organic agriculture.

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