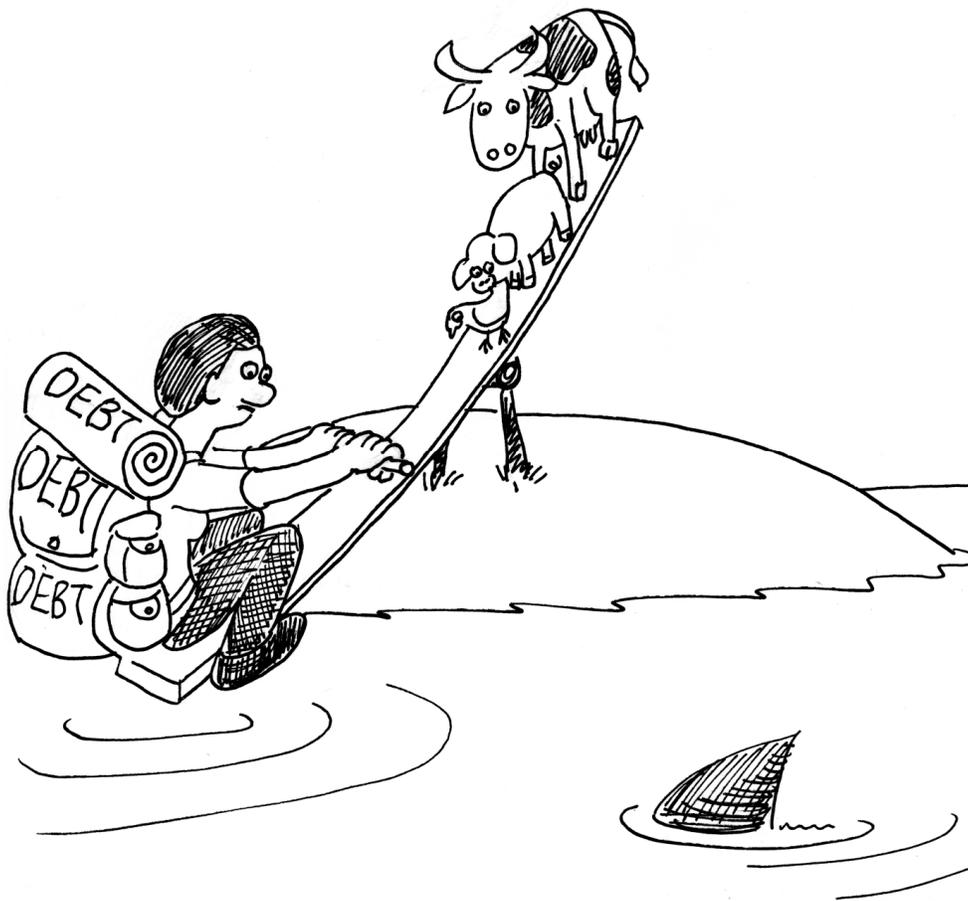


Livestock out of balance

From asset to liability in the course of the livestock revolution

Discussion paper

Evelyn Mathias



League for Pastoral Peoples and Endogenous
Livestock Development



Author: Evelyn Mathias, TradiNova Livestock

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Pragelatostrasse 20, 64372 Ober-Ramstadt, Germany, www.pastoralpeoples.org, email
info@pastoralpeoples.org



The **League for Pastoral Peoples and Endogenous Livestock Development** (LPP) is a non-profit organization devoted to advocacy and technical support for marginal livestock keepers, in particular pastoralists. It was founded in 1992 in Germany. Activities focus on research, training, capacity building and networking in co-operation with partner organizations. LPP promotes livestock development that is in balance with the planet's finite resources and takes local livestock, knowledge and institutions as a starting point for all its interventions.

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Foreword

Ilse Köhler-Rollefson

Livestock is one of human's greatest assets, and historically livestock ownership was identical with wealth. In fact, in many languages, the words for livestock and wealth are linked etymologically. For instance *pecunia*, Latin for money, is based on *pecu* (livestock), as is *pecuaria*, the Spanish word for animal husbandry. The Sanskrit word *pashu* meaning livestock has the same root and is related to *paisa* which means money. The Persian Hindi word *mal* means both livestock and goods. *Vieh*, the German word for livestock goes back to the Saxon *fehu* that refers to livestock as well as money and is also the root of the English word *fee*¹. The word *cattle* is related to capital and the whole concept of paying interest for borrowed money was taken from livestock that was given on loan and reproduced in the meantime.²

In the absence of banks and financial services, one of the main functions of livestock is indeed as means of saving wealth. This situation obtains even today in many countries such as Nigeria where 81% of net benefits derived from goat keeping consisted of banking services.³ This is because livestock can almost always be converted into cash, as and when needed, or when prices are high. Although with livestock too, "stocks can go up and down", herds generally appreciate over time and return on investments are usually higher than bank returns,⁴ or even interest rates charged on micro-finance loans.

This is beautifully illustrated by an anecdote related by Vikram Akula, one of India's micro-finance tycoons. When questioned by Bill Gates about how very poor people could possibly afford to pay 28% interest on a loan and still make money, he replied: "A landless agricultural worker might use a 2,000 rupee loan (about \$40) to buy a goat. She continues with her daily work and takes the goat along with her to the fields. The goat eats grass and virtually anything else, so there is no investment from her end. A goat gives birth to one or two kids a year and the value of the offspring is about 50% of the mother, or about 1,000 rupees. Even if a borrower took a 28% loan, she makes a return of about 70% on invested capital."⁵

Donor organisations have been well aware of the significance of livestock for poverty alleviation, and a whole industry has sprung up to provide poor people with livestock or to support livestock keepers with higher-potential animals. Considering that globally about 70% of people living on less than \$1.25 per day are totally or partially dependent on livestock, livestock-related interventions are indeed in principle an ideal avenue for alleviating poverty.

But this equation seems to have changed in the course of the "livestock revolution", the rapid expansion of industrialized animal production from developed into developing countries that was first diagnosed in 1999 by scientists from the International Food Policy Research Institute.⁶ As an organisation that supports small-scale livestock keepers in the overall context of ecologically and economically sustainable animal husbandry, the League for Pastoral Peoples and Endogenous Livestock Development became concerned when studies were published about the impact of the livestock revolution in Brazil, China and Thailand. In

¹ Schiere 1995.

² De Soto 2003.

³ Bosman et al. 1997.

⁴ Hesse and MacGregor 2006.

⁵ Akula 2010.

⁶ Delgado et al. 1999.

these countries that have experienced the full force of this phenomenon, it seemed that it was associated on one hand with a rural exodus and on the other hand with an increasing degree of indebtedness of those people opting to remain in livestock keeping.

We therefore requested Evelyn Mathias of TradiNova Livestock to look into the issue and undertake a desk study to compile the available information. The results provide some major food for thought. They do suggest that livestock has turned in many cases from an asset into a liability, since farmers and livestock keepers, in order to remain competitive, are drawn into a debt trap, because of high initial investments on one side, and because they are squeezed between escalating input prices and the consolidated power of the food processors and supermarket chains on the other.

Poignantly, the author concludes that the financial squeeze many farmers find themselves in “forces them to cut costs wherever they can, and creates strong incentives to unethical behaviour.” This observation would seem crucial with respect to current concerns and initiatives to structure and channel the global livestock sector onto a more sustainable track, for instance in the context of the current global consultation on “Building a Global Agenda of Action in support of sustainable livestock sector development”.⁷ Considering that livestock have been identified as one of the greatest enemies of the environment, the results of the study are also of relevance for the Rio+20 summit.⁸

LPP would be happy if this document stimulates wide discussion and will be grateful for any feedback on this important topic.

⁷ www.fao.org/ag/againfo/home/documents/2011_Global_Agenda_of_action.pdf and www.livestockdialogue.org.

⁸ The Rio+20 summit is the UN Conference on Sustainable Development to be held in Brazil in June 2012.

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Summary

In a growing number of countries in both the North and South, livestock producers are investing in new technologies and improved livestock, and linking up with buyers of their products. To make the investments they need, many take out loans. They do so because they want to benefit from the increasing demand for their products and because they are advised to do so. New development approaches such as inclusive business models and sustainable intensification make it possible for small-scale farmers also to participate in this “livestock revolution”.

In the short term, many of them benefit. But as more and more farmers in an area enter the technology race, and as intensification and consolidation among processors and retailers progress, the conditions get harsher and income margins decline. Factors such as a flood of laws and regulations, unfavourable contract conditions that link price premiums to unrealistic conditions, and the lack of institutional support add to the squeeze many farmers find themselves in. To stay in business, they have to invest again and again, even if this means taking on more debt. In this way many intensive dairy producers and poultry and swine contract farmers have accumulated substantial debt loads – so high that some governments have finally started paying attention to this problem.

The scarce data make it difficult to judge the overall extent of the producers’ debt situation. But the speed at which growing numbers are drawn into the livestock revolution and the debt spiral is of great concern. While until now such trends have been mostly confined to developed countries and fast-growing economies, small-scale farmers in other developing countries are bound to be increasingly affected. As livestock farms specialize, their flexibility declines, offsetting their ability to react to unforeseen changes. If a livestock disease strikes or a buyer goes elsewhere or closes down, many can no longer repay their debts. They have to sell up or face bankruptcy.

Many farms have such small margins that they are forced to cut costs wherever they can. This creates incentives for unethical behaviour and even criminal action. The overuse of antibiotics and the improper disposal of waste and carcasses are perhaps the most pertinent of such problems, leading to micro-organisms resistant to treatment, environmental pollution, and public health risks. Governments and livestock specialists commonly perceive smallholders, rather than large-scale producers, as a bigger source of risk, as larger farms are more likely to invest in the technologies to prevent air and water pollution and improve hygiene. Big producers are also viewed as easier to control. But it is often they who manage to evade the law, and the damage they cause is correspondingly larger.

Small-scale livestock producers and pastoralists, on the other hand, often produce in an environmentally friendly way. They can also be very cost-efficient and produce at a lower per-unit cost than large farms. Their substantial contribution to food production is commonly underestimated, and so are their roles in maintaining wild and agro-biodiversity and in providing other services to the wider society. But it is often impossible for these producers to compete with large, industrial producers, especially if the latter benefit from tax breaks and other direct or indirect government support.

To prevent the mass exodus of small-scale farmers and pastoralists, governments and development professionals need to provide a level playing field for these producers and help them avoid the debt trap. Measures should include recognizing their rights regarding their access to land, resources, services and information; developing enabling institutional and legal frameworks and an infrastructure conducive for local and regional marketing; and preventing the consolidation of the livestock sector.

Background

The world's livestock sector is bubbling. Demand for meat, eggs and dairy products is growing, and both food processing and international trade are up. Processors and retailers are expanding their businesses into new countries and continents, and they report increasing turnover and profits.⁹ Consumers – especially those in the cities – benefit from the enhanced availability of livestock products at prices that even poorer people can afford.

Many farmers, too, are among the winners of this ongoing “livestock revolution”,¹⁰ gaining from the increased demand for their products. To enhance their efficiency and scale up their production, growing numbers of them are investing in improved animals, technologies and facilities and are linking up with other players in their sector. While such ventures used to be undertaken mostly by richer, and bigger producers, recent development approaches nowadays enable small-scale farmers also to participate, furthering their integration with buyers and other players in the value chain.¹¹

A rosy picture, apparently. But a closer look gives a gloomier view. The common advice, “you have to grow in order to survive”, that livestock farmers in Europe and the USA have been receiving for many decades has proven detrimental for the majority of farms,¹² and their counterparts in Eastern Europe and fast-growing economies like Brazil and Thailand are starting to have the same experience.¹³ As size and intensification of the production units grow, the number of farmers staying in the game is declining rapidly. In Rio Grande Do Sul in Brazil, where contract farming has a history of several decades, the number of specialized pork producers fell from 85,000 to 10,000 between 1995 and 2008.¹⁴ Romanian pig farmers experienced an even faster exodus. When the multinational company Smithfield expanded its business into Romania in the past decade, the number of Romanian pig producers declined 90% within four years.¹⁵

Many of those remaining are burdened with large debts. Take poultry producers in the USA, whose numbers halved during the latter half of the 20th century.¹⁶ According to a USDA survey,¹⁷ in 2006 there were about 17,440 poultry farms in the 17 US states that account for 94% of the country's broiler production. More than 98% of these farms were contract farms. Absolute numbers on their debt load are hard to find, but based on the survey data one can

⁹ See, for example, The Wall Street Journal of 28 July 2011 on Danone's dairy division, <http://online.wsj.com/article/SB10001424053111904888304576473293707134016.html> (accessed 28 March 2012).

¹⁰ Delgado *et al.* 1999.

¹¹ See, for example, UNDP 2008.

¹² See McMichael 2005 for a discussion of the global trends in the agricultural labour force.

¹³ Delforge 2007, Lundström 2011; and Doreen Carvajal and Stephen Castle: A U.S. hog giant transforms Eastern Europe, The New York Times, 5 May 2009, www.nytimes.com/2009/05/06/business/global/06smithfield.html?_r=1&pagewanted=all&_ga=2.11955.11955.11955.11955.11955 (accessed 2 April 2012).

¹⁴ ACSURS 2009, cited in Lundström 2011, p. 216.

¹⁵ www.nytimes.com/2009/05/06/business/global/06smithfield.html?_r=1&pagewanted=all&_ga=2.11955.11955.11955.11955.11955, and www.farminguk.com/news/Romania-Smithfield-make-large-investment-in-pig-industry._11955.html (both accessed 2 April 2012).

¹⁶ <http://business.highbeam.com/industry-reports/agriculture/broiler-fryer-roaster-chickens> (accessed 29 March 2012).

¹⁷ MacDonald 2008.

extrapolate that about 12,200 of the farms had an average debt of over US\$ 204,000. Younger farmers had much higher debts than older farmers.¹⁸

But farmers who remained independent or who operate under other, more participatory business set-ups are also fighting for their survival. Dairy farmers in Denmark, for example, are among the farmers with the biggest debts in Europe¹⁹ (Box 1). Between 2004 and 2008, around 3,000 of them had invested in new production systems, new technology and more milk quota, and more than 10% switched to the automatic milking systems, or “milking robots”.²⁰ The vast majority are members of Arla Foods, a co-operative and global dairy company that in January 2011 was owned by 7,178 Danish, Swedish and German farmers.²¹ But in 2010, some 6% of Arla’s farmers left the company because they chose so or ceased production.²²

Box 1. Danes burdened with massive debt

“Rapid consolidation, strict environmental rules and a costly inheritance structure have left Denmark’s 3,780 dairy farmers crippled with massive debt. A milk price of 32c to 33c per litre is needed for Danish dairy farms to survive, according to producers I met there recently.

“When milk quotas were introduced in 1984, both Ireland and Denmark had a similar volume of milk, but Ireland had over 60,000 producers compared with Denmark’s 33,800.

“Today, Ireland still has around 17,500 milk producers while dairy farmer numbers in Denmark have shrunk to just 3,780. Average herd size in Ireland is around 50 cows while Denmark is now at over 130. This rapid consolidation has left the remaining farmers saddled with massive debt of €2.25m per farm, or €19,000 per cow. Huge investment in expensive land, quota and buildings saw debt per cow rise by almost 50% between 2004 and 2008.”

Source: Pat O’Keefe, 27 March 2010²³

While non-government organizations and social scientists have been pointing to the debt situation of livestock farmers for quite some time,²⁴ the mainstream literature on intensification and economics of the livestock sector has until recently been largely silent on this problem and its potential impacts on the environment and public health.²⁵ To start closing this gap, this study identifies and discusses the factors driving farmers into debt and out of business. It also highlights some of the consequences of these developments for the farmers, the environment and public health, and provides suggestions for alternative pathways. To understand better why farmers do what they do, I begin by looking at the context under which they operate.

¹⁸ MacDonald 2008.

¹⁹ Pat O’Keefe at 27 March 2010, www.farmersjournal.ie/site/farming-Danes-burdened-with-massive-debt-10780.html (accessed 6 Feb 2012).

²⁰ Nygaard undated. See also Lassen *et al.* 2012 for a survey on the interest of European dairy farmers in AMS.

²¹ www.arla.com/about-us/our-company/ (accessed 10 March 2012).

²² www.arla.com/Upload/Global/Publications/PDF/arlacsr2010UK.pdf (accessed 10 March 2012); but from the overall figure, it is unclear which percentage of the Danish farmers had dropped out.

²³ www.farmersjournal.ie/site/farming-Danes-burdened-with-massive-debt-10780.html (accessed 6 Feb 2012).

²⁴ See the list of publications at www.rafiusa.org/pubs/puboverview.html#electronicpubs (accessed 7 March 2012).

²⁵ Ramaswami *et al.* 2006, Zakir 2008, BIRTHAL and Kumar 2009.

Methods and terminology

The study is based on an extensive review of the literature on the livestock revolution, contract farming and the inclusion of small-scale farmers in livestock intensification and value chains. While the situation of this farmer group in the developing world (the “South”) is the study’s main concern, the discussion draws on findings from both the developed world (the “North”) and the South.

Farmers are grouped into “independent farmers” and “contract farmers” (farmers linked with processors through contracts) rather than differentiating them according to farm sizes. This proved more useful as the report seeks to highlight principles and trends over time and across continents, and some of today’s large contract farmers in the North were small and independent when contract farming started in the 20th century.

The vocabulary the literature uses for farmers and processors varies between sectors and authors. Farmers are also referred to as “producers”, “contractors”, and in the case of the poultry, “growers”. Processors are also called “buyers”, “companies”, “employers”, “packers” (in the case of swine production) and “integrators” (in the case of poultry). This study mostly uses the terms farmers and producers, and processors and buyers, but where necessary, it follows the terminology of the respective sources.

Approaches to enhancing livestock production²⁶

Experts broadly agree that livestock production needs to intensify and expand to keep up with population growth and meet the increasing demand for meat and other livestock products. But opinions diverge about the **how** and **how much**. They split up between the following approaches, which in reality rarely exist in such a pure form; most farms will combine characteristics of both.

Optimize production processes and the use of locally available resources. The emphasis is on management changes and some improvement of the local breed through selection, or the use of adapted breeds. The approach minimizes investments and external inputs, and requires a thorough understanding of the local breeds, the environment, and the interaction of both. Family labour is a crucial component of such systems. Marketing can follow several pathways, including direct marketing.

Production increases will be moderate, but due to the low running costs, the producer can still obtain high income margins. Because of the limited dependence on external inputs, the system will not be affected much when the prices for fodder or other inputs rise.²⁷

Development paths that promote such concepts are agro-ecology²⁸ and endogenous livestock development.²⁹

Change the system and replace adapted strategies and labour with technology and energy. The goal is to maximize production, achieved by keeping as many animals as possible under standardized conditions, in an area as small as possible. This means investing in modern machinery, buildings and high-yielding animals, and relying mostly on external

²⁶ See Hooft *et al.* forthcoming for an more extensive discussion on this.

²⁷ See, for example, Hemme and Otte 2010.

²⁸ Altieri *et al.* 2011.

²⁹ Hooft *et al.* 2008.

inputs to keep the new system running. The marketing of such numbers of livestock and their products commonly requires specialized mechanisms. Direct marketing plays only a limited role and hardly any in highly industrialized production systems, except perhaps in dairy production.

While technology-based intensification can increase production much more quickly than the first approach, it requires substantial investments, often secured through credit. Furthermore, producing large numbers of animals in a comparatively small place and a short time results in a lot of waste and gives rise to a number of environmental and public health problems. The costs for dealing with these problems have until recently been mostly externalized and had to be picked up by the tax payer.

Historically, this approach to intensification has been mostly associated with large farms and industrial production systems. The trends towards mega stables and agroparks promoted by Dutch universities and the Dutch government go in same direction.³⁰ In contrast, a new development approach called “sustainable intensification” recently started to induce system changes also among small-scale mixed crop-and-livestock famers and help them intensify their production. While the approach centres on the introduction of technologies and external inputs, these are commonly more locally adapted than the ones in fully industrialized systems.³¹

Commodity or asset – why is livestock special?

The current livestock sector trend towards mass production and the replacement of labour with technology is consistent with the trends in other industrial sectors.³² A frequent argument in favour of such a commodification of livestock and the industrialization of agriculture is that processed products from crops and livestock do not differ in principle from other industrial products. Therefore, to be able to compete in the age of growing industrialization and globalization, livestock farmers need to invest in improved livestock and technologies to become more productive and efficient.

The counter-position argues that agriculture not only generates food and renewable resources but also provides numerous other services valuable to society: the preservation of the landscape, protection of biotopes, natural resources and biodiversity, a contribution to the economic viability of rural areas as well as to the maintenance of their cultural heritage and regional identity.³³ Arguing for a special case for livestock and agriculture does not mean turning backwards but moving forwards towards a modern model of agriculture going beyond production and catering to growing social and ecological requirements.³⁴

Beyond these advantages of agriculture in general, livestock in particular offers some additional advantages, especially as it is among the few products of the poor for which demand is growing.³⁵ Locally-adapted breeds can survive and produce in areas where crops

³⁰ See www.alterra.wur.nl/UK/research/International+research/Projects+in+Asia/agroparks/ and <http://webdocs.alterra.wur.nl/internet/corporate/prodpubl/nieuwsbrieven/NewsletterAgroparksChina6.pdf> (accessed 29 March 2012).

³¹ Sustainable intensification in smallholder crop-livestock systems www.ilri.org/SustainableIntensification (accessed 25 March 2012).

³² Pew Commission 2008.

³³ Hendrickson and James Jr. 2005, Bergschmidt and Wilstacke 2005, Thornton 2010.

³⁴ Bergschmidt and Wilstacke 2005.

³⁵ Delgado *et al.* 2008, Dijkmann 2009.

cannot grow. Such frugal animals are essential to the food security of marginal areas. In addition, they often fulfil many different roles and functions for their keepers.³⁶

Perhaps most important in the context of this study, livestock can be a self-replicating asset that not only lives on natural resources and produces with minimal external inputs but can also give high returns to their owners at nearly nil investment. Scavenging backyard chickens, for example, can produce some 16-17 surviving offspring pro hen and year³⁷ and bring their owner up to 700% annual return of capital invested per chicken.³⁸

This way the livestock serves as a low-cost and low-input source of income and an important capital reserve for the poor.³⁹ The low initial investment and running costs and the multi-functionality of their animals enable small-scale livestock keepers to be flexible and react to changing circumstances. For example, when wool prices declined, Raika herders in India were able to continue keeping their camels and sheep by switching from wool production to the sale of mutton and camel milk.⁴⁰

The livestock revolution

When the International Food Policy Research Institute (IFPRI) coined the term “livestock revolution” in 1999,⁴¹ it assumed that the increasing demand for livestock products could be met only by the use of technologies, high-yielding animals and improved fodder. Further assumptions addressed the extent and drivers of the increasing demand for livestock products and the level of grain prices and other inputs.⁴² IFPRI concluded that poor producer “*have to be linked vertically with processors and marketers of perishable products*”.⁴³ Only this way would they be able to get access to the inputs and skills they needed for scaling up and becoming more efficient and benefit from the increased demand.

Status quo and trends

A reality check after the first decade of the livestock revolution indicates that some but not all assumptions have materialized.

As predicted, global production and consumption of livestock products have continued to grow. The total production of meat – beef, pork, mutton, goat and chicken meat together – rose by some 21% worldwide between 1999 and 2009.⁴⁴

But such global figures disguise that the rapid growth and industrialization of livestock production through improved technologies and integrated business models have been confined to a few fast-growing economies like Brazil, China and Thailand, rather than being a global phenomenon.⁴⁵ It is also in these countries that a noteworthy integration of small-

³⁶ FAO 2009, Köhler-Rollefson *et al.* 2009, Köhler-Rollefson and Mathias 2010.

³⁷ Khallafalla *et al.* and Msami cited in Mathias 2006, Footnote 78 on p. 19.

³⁸ FAO 2006.

³⁹ Ramdas and Ghotge 2005, FAO 2010.

⁴⁰ LPPS 2003.

⁴¹ Delgado *et al.* 1999.

⁴² Delgado *et al.* 1999, p. 2.

⁴³ Delgado *et al.* 1999, p. 2.

⁴⁴ FAO Statistical Yearbook 2010 (accessed via Google <http://sites.google.com/site/viveklpm/livestock-statistics/world-livestock-statistics/world-meat-production> 29 March 2012).

⁴⁵ Pica-Ciamarra and Otte 2009; these authors point out, however, that those countries where the livestock revolution has taken place (Brazil, China, etc.) present a large share of the world's population.

scale livestock farmers with processors and distributors has occurred. In many other countries in the South, the increase in livestock production has been rather marginal, and in most of sub-Saharan Africa the sector has, at best, been stagnant.⁴⁶ The hopes that the livestock revolution would contribute to poverty reduction have yet to be fulfilled.⁴⁷

The development of per capita consumption of livestock products has been in line with the trends in production. With some exceptions – mainly of milk in Kenya and poultry in South Africa – per capita consumption in sub-Saharan Africa has remained very low, or has even decreased. Increases were recorded for pork and poultry in China, for milk in India, and for poultry in Latin America.⁴⁸

Analysts expect that future increases in demand may stay behind the forecasts, as past global increases can be largely attributed to population growth and less so to urbanization and rising per capita incomes.⁴⁹

Different from the predictions, prices for cereals and other agricultural and natural commodities leaped to an unexpected high between 2002 and 2008, dampening demand and growth.⁵⁰ Although prices have slightly fallen since, analysts believe that they are likely to stay above pre-2002 levels at least for the mid-term.⁵¹ Other unforeseen developments were the development of new livestock diseases such as mad cow disease (BSE) and avian flu, and their impact on international trade and the demand for livestock products.⁵²

In developed countries, the consolidation of the livestock sector has continued to advance, both at the producer and company levels.⁵³ In some countries in Europe, in the USA and possibly in some other developed countries, meat consumption has started to decline.⁵⁴ But production continues to grow and the trade with meat and other livestock-based food products has expanded, supported by governments through subsidies, market intelligence, an improved infrastructure and a conducive political framework⁵⁵ (see also below).

Parallel to these trends movements against industrial livestock production have started forming, especially in developed countries. The emergence of new livestock and zoonotic diseases, environmental pollution, overuse of antibiotics, animal welfare issues and more recently also climate change have drawn together civil society organizations, farmers and consumers to form alliances and press for reduced meat consumption and more government support to sustainable livestock production. Local and regional alternative marketing schemes are springing up, where farmers directly liaise with consumers. In the USA, direct-to-consumer food sales more than doubled between 1997 and 2007 from US\$ 551 million to US\$ 1.2 billion.⁵⁶

⁴⁶ Dijkman 2009.

⁴⁷ Dijkman 2009, Pica-Ciamarra *et al.* 2010.

⁴⁸ Dijkmann 2009.

⁴⁹ Dijkmann 2009, Pica-Ciamarra and Otte 2009. See also Rae 2008 on the situation in China.

⁵⁰ Dijkmann 2009.

⁵¹ Dijkmann 2009.

⁵² See Hall *et al.* 2004.

⁵³ Gura 2007.

⁵⁴ In Germany per capita consumption decreased from 64 kg in 1991 to 60.5 kg in 2009 (BMELV 2010, Table 276 on p. 235).

⁵⁵ Busse und Mathias 2011.

⁵⁶ Martinez *et al.* 2010 cited in De Schutter 2011, p. 18.

Drivers beyond demand

In addition to the “pull” factor of demand, the livestock revolution has also been driven by a number of push factors, including the availability of improved technologies, high-yielding animals and cheap inputs supported through favourable national and international policies and legislation, financial support and conducive institutional frameworks.

Governments in the North started in the 1930s (and perhaps earlier) to further livestock production through research, advisory services, credit, subsidies and legislation.⁵⁷ While the original intention was enhanced food production and food security especially among rural populations during crisis times, financial support mechanisms and policies nowadays tend to speed up the “treadmill” processes in the livestock sector. The treadmill describes an economic mechanism where in situations of falling product prices early adopters of new technologies can capture windfall profits; but they will lose their economic advantage as others adopt the technology and overproduction and further price reductions result. As the squeeze goes on, some farmers will drop out while others will absorb their resources and benefit from the enhanced production.⁵⁸

An example of such governmental support is last century’s Common Agricultural Policies of the European Union and more recently, the support for biogas production in Germany. The latter is driving competition for land and capital, and through this, dramatically exacerbating the decline of farms.⁵⁹ As many of the farmers partly farm on leased land, they can no longer keep up with the rising costs for the lease, so give up farming.⁶⁰ Between 2009 and 2010, nearly 4,000 or about 4% of German dairy producers gave up.⁶¹

In the South, industrial farming in the livestock sector started as early as the 1950s. Among the pioneers was Brazil, importing hybrid chickens from overseas and introducing contract farming.⁶² Thailand followed some two decades later.⁶³ As of the 1980s, the governments of both countries furthered the expansion of technology-based livestock intensification of livestock and contract farming with measures such as tax breaks and public credit for poultry companies.⁶⁴

Other countries from the South have followed or are starting to prepare for the livestock revolution. In India, for example, policy initiatives by the central and state governments aim to further the deregulation of the food industry and demonopolization of agricultural markets, enact an integrated food law, reduce excise duties on manufactured food products, and give priority sector lending to the food industry to strengthen agriculture–industry linkages.⁶⁵

⁵⁷ See, for example, the live-at-home campaign in the USA in the 1930s, <http://history.ncsu.edu/projects/ncsuhistory/nceats/exhibits/show/consumerism/section2/live-at-home-campaign>; (accessed 18 Feb 2012) and Folsom Jr. 2006.

⁵⁸ Cochrane 1958, cited in Hounkonnou *et al.* 2012, p. 77.

⁵⁹ EDF 2010, p. 2.

⁶⁰ In 2007, around 70% of all agricultural farms in Germany had leased some land, about 41 ha on average making up nearly 62% of the land they used for agriculture (BMELV 2010, Table 35 on p. 39).

⁶¹ <http://www.elite-magazin.de/news/Acht-Prozent-halten-mehr-als-100-Kuehe-513873.html> (accessed 1 April 2012).

⁶² Gura 2008, p. 52.

⁶³ Delforge 2007, p. 4.

⁶⁴ Delforge 2007, Gura 2008.

⁶⁵ Birthal and Kumar 2009.

Neglect of alternative pathways to livestock development

About a decade ago, industrial production accounted for about 67% of the world's poultry meat output, 42% of its pig meat, 50% of the eggs, 7% of beef and veal, and 1% of sheep and goat meat.⁶⁶

But most of the non-poultry meat and milk came from non-industrial systems. Rainfed mixed farms contributed 48% of the beef, 53% of the milk and 33% of the mutton worldwide.⁶⁷ In countries where pastoralism prevails, pastoralists supply substantial shares of these products. In Ethiopia, for example, milk produced by pastoralists makes up 65% of national production, not counting the large amounts consumed by pastoralists themselves.⁶⁸ National statistics often ignore production by pastoralists. In the few countries where it can be measured it contributes significantly to the economy. In Uganda, pastoralism contributes about 8.5% of the gross domestic product; in Ethiopia the figure is 9%; in Mali, 10%; in Kyrgyzstan, 20%; and in Mongolia, 30%. Focusing just on agriculture, pastoralism supplies about 80% of the agricultural output of Sudan, Senegal and Niger.⁶⁹

These numbers are from the first years of the 2000s, and may have changed since. But it is clear that the producers in such systems continue to contribute large shares of the world's meat and milk. Despite this, and despite their ecological advantages and their huge potential, they do not receive the support they need to continue, improve and expand their adapted low-input modes of production.⁷⁰ Instead, donors have started large programmes to replace such knowledge- and management-intensive livestock production approaches with one-size-fits-all models based on expensive technologies and introduced breeds (see below).

Investments and integration: Entry points into the livestock revolution

Where opportunities arise, small-scale livestock producers frequently go for the system change described in the section *Approaches to enhancing livestock production* – even if this means going into debt. To get access to the necessary inputs, many of them follow the advice of the livestock revolution promoters and link up with processors and other players.

Such linkages can follow different business models, ranging from purchase agreements to the full integration of producers and buyer (Figure 1).

The terminology of the models varies, and there seems to be no standard definition for the different categories.⁷¹ One and the same model can come in many variations depending on the number, background and functions of players involved, the commodity, the context, and the details agreed on.⁷² **Contract farming**, for example, can mean different things in different countries. In the USA, it is commonly regarded as a form of vertical integration, while the UK terminology restricts vertical integration to ownership integration.⁷³ One publication describes it as:

⁶⁶ FAO 2007, p. 156.

⁶⁷ Steinfeld et al. 2006, cited in McCleod 2011, p. 53.

⁶⁸ Rodriguez 2008 cited in FAO 2009, p. 9.

⁶⁹ Rodriguez 2008 cited in FAO 2009, p. 9.

⁷⁰ Altieri et al. 2011.

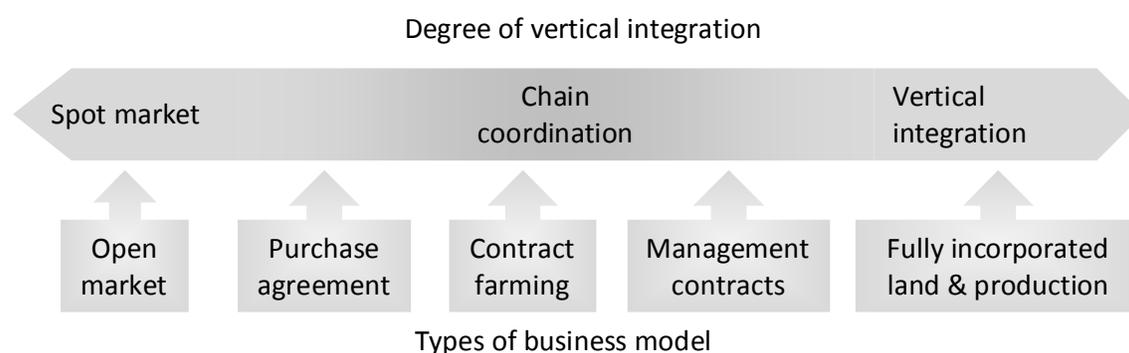
⁷¹ See, for example, Rehber 1998.

⁷² See for example, Rehber 1998, Eaton and Shepherd 2001, Vermeulen and Cotula 2010.

⁷³ Rehber 1998, p. 4.

“pre-agreed supply agreements between farmers and buyers. Usually, local farmers grow and deliver agricultural produce for specified quantity and quality at an agreed date. In exchange, the company provides upfront inputs, such as credit, seeds, fertilisers, pesticides and technical advice, all of which may be charged against the final purchase price; and agrees to buy the produce supplied, usually at a specified price.”⁷⁴

The details of the arrangements are commonly spelled out in a contract. This can be a rather general agreement of a page or so, up to a multipage document describing in detail all conditions and arrangements.⁷⁵



Adapted from Vermeulen and Cotula 2010

Figure 1. Business models at increasing levels of vertical integration

The literature differentiates several types of contracts but these seem to be as little standardized as the types of business models.⁷⁶ Dairy producers commonly keep their own animals and have contracts with their buyer specifying the price, quantity, quality and time of delivery of the produce. Such contracts are also termed “market specification contracts”.⁷⁷ Broiler growers commonly operate under “production contracts” where the company supplies all the inputs, including the chicks. The growers basically raise the animals for the company.⁷⁸ Production contracts are common also in the swine industry.⁷⁹ But apart from this general typology, contracts and their content are highly variable, often to the disadvantage of the producer (Box 2).

⁷⁴ Vermeulen and Cotula 2010, p. 4. See also www.fao.org/ag/ags/contract-farming/faq/en/#c100440 (accessed 11 Feb 2012).

⁷⁵ Vermeulen and Cotula 2010, p. 41.

⁷⁶ See, for example, Eaton and Shepherd 2001.

⁷⁷ Al-Hassan *et al.* 2006, p. 46.

⁷⁸ Food and Water Watch 2011.

⁷⁹ See Eaton and Shepherd 2001.

Box 2. Contract farming⁸⁰

In the livestock sector, contract farming is most advanced for broiler, swine and dairy production. In contrast to developed countries, where contract farmers nowadays tend to be large-scale producers, contractors in the South are increasingly recruited from the small-scale sector. The actual size of the contracted farms and the definition of what is “small” and “large” varies between countries and sectors.

In Brazil, where contract farming accounts for 75% of poultry production,⁸¹ poultry and swine are the domain of small-scale farmers, while cattle are mostly kept on large-scale farms.⁸² In contrast to this, in India small-scale farmers make up more than half of the dairy contractors, while about two thirds of the poultry growers are large farmers.⁸³

The coverage of contracts is commonly a matter of negotiation between contract partners; in most instances the buyer sets the terms. While contracts have to comply with national and international legislations, there are no general standards for contracts, making it easy for companies to draft contract conditions to their own advantage, a danger especially in the case of new and inexperienced producers or where alternative choice for producers are largely absent.

Civil society organizations especially in the USA have been aware of this problem for several decades and support producers by providing information and advice on contracts and their rights.⁸⁴ A few years ago, the US government finally took action and introduced regulations to strengthen the position of its poultry, swine and livestock producers and protect them against abusive contracts.⁸⁵

Furthermore, business models can change over time, and originally farmer-driven arrangements can end up as a combination of different models in which the farmers’ say decreases. An example is Arla Foods in Denmark. Originally a farmer cooperative, Arla has through multiple mergers and acquisitions grown into a global player, triggering a power shift within the coop from farmers to corporate members.⁸⁶

The foregoing highlights that it is less the business model than the details of the arrangement that makes the difference for the producer. An area’s overall economic situation is another influence on the contract conditions a farmer can get.

Where farming intensification is low, market integration just starting and incoming firms need to gain the trust of producers, farmers tend to obtain favourable conditions such as inputs at reduced prices or even for free. This way they can – at least in the short run – substantially benefit from the arrangement with the buyer. An example for such a set-up is the franchise milk collecting system that the supermarket chain Reliance is developing together with BASIX, an Indian non-government organization, in villages near Mahabubnagar in India.⁸⁷ Governments and international development organizations like

⁸⁰ See Simmons (2002?) for an overview over contract farming.

⁸¹ UNCTAD 2009, cited in Vermeulen and Cotula 2010, p. 41.

⁸² Lundström 2011.

⁸³ BIRTHAL and Kumar 2009.

⁸⁴ See Klauke 2005, and www.rafiusa.org/programs/contractag/contrag.html (accessed 7 March 2012)/

⁸⁵ See www.rafiusa.org/programs/contractag/farmbillfactsforgrowers.html and

www.rafiusa.org/programs/contractag/growerfacts07regs.html (both accessed 7 March 2012); and

http://scl.gipsa.usda.gov/main_about_scl.html#howinfo (accessed 31 Jan 2012).

⁸⁶ www.hoffmanmarcom.com/docs/Business_process_case_study.pdf; see also

www.arla.com/Upload/Global/Publications/PDF/arlacr2010UK.pdf for an institutional chart (both accessed 10 March 2012).

⁸⁷ See KIT and IIRR 2010, pp. 68-81.

UNDP have started to support such favourable “inclusive” arrangements between companies and small-scale farmers at a large scale⁸⁸ (Box 3).

Box 3. Inclusive business models

Inclusive business models are a relatively new development approach furthering the integration of small-scale producers with processors and other buyers for their products.⁸⁹ The concept is designed to offer new livelihood opportunities for low-income communities.⁹⁰ In the agricultural sector, the approach facilitates the market integration of (poor) small-scale farmers as producers and consumers and gives them access to inputs, knowledge and credit – market entry barriers otherwise difficult to overcome for the poor.⁹¹

Inclusive models reflect the categories used in conventional business (Figure 1)⁹² whereby the line between “conventional” and “inclusive” is not always obvious. But unlike conventional models, inclusive arrangements tend to give small-scale farmers more favourable conditions; plus, civil society or other types of organizations often help to make the link and manage the process.⁹³

For businesses, the benefits of inclusive business models include driving innovations, building markets, strengthening supply chains, getting access to land and other resources, and securing a steady supply of raw materials and products.⁹⁴ Major disadvantages are heightened transaction costs when dealing with large numbers of small-scale farmers and the risk that farmers may accept the firms’ inputs but then sell them, use them for something else, or sell the resulting products to another buyer, contrary to their agreement with the firm.⁹⁵

Poor small-scale producers, on the other hand, are attracted by the higher productivity, sustainable earnings and greater empowerment that such alliances can give them.⁹⁶ Risk reduction is another pull factor even if the contractual relationship reduces market opportunities for the farmer.⁹⁷ Difficulties for contracted producers arise if there are unexpected developments like market and price changes and if the initial distribution of profit, risks and say within the value chain gets distorted over time at the expense of the producers.

Promoters of inclusive arrangements tend to be enthusiastic about this approach. But until recently they paid little attention to factors that determine its long-term perspective. These include a farm’s cash-flow situation, its share of liability of total assets, and the contract conditions. A potential problem with these approaches is their reliance on instant models, often introducing breeds and external inputs at a large scale and high speed, rapidly replacing local resources and breeds – sometimes even without being aware of their existence.⁹⁸ Besides, introduced breeds are commonly more fastidious and increase the farmer’s dependency on external inputs.

⁸⁸ See, for example, www.growinginclusivemarkets.org/ and UNDP 2008.

⁸⁹ The term has been coined by the World Business Council for Sustainable Development, see www.inclusivebusiness.org/2010/12/wbcds-inclusive-business-india.html (accessed 5 March 2012).

⁹⁰ www.inclusivebusiness.org/2010/12/wbcds-inclusive-business-india.html (accessed 5 March 2012).

⁹¹ Melchers and Rockenbauch 2011, Gradl and Jenkins 2011.

⁹² Vermeulen and Cotula 2010.

⁹³ See, for example, KIT and IIRR 2010.

⁹⁴ UNDP 2008, Vermeulen and Cotula 2010.

⁹⁵ See the description of the Darko poultry project in Al-Hassan *et al.* 2006. According to Holmes (2012), buyers can reduce the risk of side selling through building up mutual trust, transparent and fair contracts and punctual delivery of the agreed inputs.

⁹⁶ UNDP 2008, Vermeulen and Cotula 2010.

⁹⁷ Birthal and Kumar 2009; Kukeawkasem 2009.

⁹⁸ Author’s personal observation during a field visit in Mahubnagar in January 2010. The project introduced Murrah buffaloes without assessing the local breed and production system. While the Murrah cows had a higher yield than the local cows, some farmers thought that the milk of their buffaloes was more concentrated.

But as intensification in an area progresses and the value chain gets more specialized, the conditions tend to become harsher and the required investments for farmers are accordingly higher, as reported for poultry and swine producers in the USA, Brazil and Thailand⁹⁹ and dairy farmers in Denmark (see also section *Unfavourable contracts*).

Why do farmers invest and link up with buyers of their products?

Faced with rapidly changing environments and conditions, farmers daily witness the dynamics and vibrant changes within their own sector. Their decisions are informed by a range of factors, including their own desire to improve their efficiency and income, their hope to save time and have more flexibility by replacing labour with technology,¹⁰⁰ advice from extensionists and other advisors to scale up, the lack of unbiased and comprehensive information, the absence of viable alternatives in many regions, and their fear of losing out to their peers who have opted to invest.¹⁰¹ The latter are more likely to be selected by companies as contractors and can get paid higher prices for their products.¹⁰²

Messages from outsiders – whether researchers or private or public advisors – often boost this fear and urge to invest (Box 4). Technologies continue to be seen as the key to efficiency and investors as forward looking and modern, prepared to accept new technology, while farmers running their farm without large investments are considered as backward and interested only in short-term returns from their enterprise.¹⁰³

Box 4. Be bold and invest

In 2008, during the workshop “*Courage to [invest in] milk*” organized by staff from a local government in southern Germany, farmers were advised that they needed to scale up and modernize to make their farm more attractive for the future generation. Presentations during this workshop informed them about government financial support for dairy farmers to improve their business.¹⁰⁴ According to a model calculation during this workshop, a farm with 37 cows would need to invest some €548,000 to buy additional milk quota, build a modern stable with up-to-date production facilities and stock up to 60 cows. The German government would contribute €147,000 for the building, while the farmer would need to cover the rest through his or her own capital and credit (the latter set at €293,000 in the model calculation).¹⁰⁵

High-tech solutions get promoted and accepted sometimes even before their economic, environmental and social implications of the technology have been assessed.¹⁰⁶ An example

⁹⁹ Delforge 2007, MacDonald 2008, Taylor and Domina 2010, Lundström 2011.

¹⁰⁰ See, for example, Oudshoorn 2009.

¹⁰¹ According to Taylor and Domina 2010, US contract poultry growers have very limited access to information, so find it hard to judge whether the contract they get offered is fair.

¹⁰² Kukeawkasem 2009, p. 94, Taylor and Domina 2010.

¹⁰³ See, for example, Nygaard undated; Kukeawkasem 2009, p. 24.

¹⁰⁴ www.alf-ba.bayern.de/progr.mut_zur_milch.pdf (accessed 18 Feb 2012).

¹⁰⁵ www.aelf-co.bayern.de/tierhaltung/29344/linkurl_11.pdf (accessed 18 Feb 2012). In December 2011, the subsidies for large stables were no longer available (<http://dlz.agrarheute.com/foerderung-467126>, accessed 2 April 2012).

¹⁰⁶ Oudshoorn 2009, p. 13.

are the above-mentioned milking robots, viewed as the future by dairy advisors in Denmark and adopted by growing numbers of farmers especially in Denmark and the Netherlands.¹⁰⁷ But these systems tended to disappoint economic hopes. While cows in such systems produce more milk and have less mastitis, increases of net farm income have not lived up to expectations, and the systems come with a number of negative consequences for milk quality and the environment.¹⁰⁸ Recently, some advisors have started cautioning farmers against making investments that are too high.¹⁰⁹

But even if they are advised against linking up with a company and investing, farmers may still do so. The prospect of getting access to some cash is just too attractive. In Thailand, 16 out of 26 interviewed broiler contract farmers said that they would not recommend anybody to become a contract farmer. But such warnings would not deter others from entering a contract relationship despite the high investments required. In the contrary, many farmers believe that the naysayers wanted to keep the money for themselves. The other 10 interviewed farmers regarded contract farming as a better option than doing nothing, given the lack of alternatives and the need to repay their debts.¹¹⁰

Pressures on farmers

Farmers who have invested soon find out that a single investment is not enough. A number of factors, trends and forces make their life difficult and drive them to ever more investments and debts. Some of the factors, but not all, are controllable.

Economies of scale

The expansion of production commonly allows farmers to reduce their unit costs. This is referred to as “economies of scale”. They are among the reasons that small farms tend to lose out even if they operate cost-efficiently and produce at a lower per unit cost than large farms. Such efficiency is of little use to the small farms when profit margins are sinking, because of falling product prices, increasing costs, or other unforeseen factors. Then large producers are able to make up in volume what they lose in per-unit profit.¹¹¹

Consolidation of the livestock sector

The integration of production and processing within a single firm, and the decreasing number of processors and retailers, reduce the surviving farmers’ sources of inputs and potential customers. With growing consolidation of the sector, the negotiating power of farmers is sinking, to a point that even the formation of associations and coops fails to strengthen their position (Box 5). In the absence of alternatives, growers have little choice but accept whatever contract conditions they get offered, even if they put them into a squeeze.

¹⁰⁷ Nygaard undated, Lassen *et al.* 2012.

¹⁰⁸ Oudshorn 2009.

¹⁰⁹ Reil 2009.

¹¹⁰ Delforge 2007.

¹¹¹ Delgado *et al.* 2004(?), MacDonald *et al.* 2007, Delgado *et al.* 2008.

Box 5. Development of the Arkansas chicken industry

The Arkansas chicken industry started developing in the 1890s. Towards the 1940s processors started to integrate production in their business. The market leader was Tyson, which was by the early 1960s fully integrated, controlling every aspect of production, from hatchery to retail sales of broilers.

“The industry itself changed dramatically during these years. As major producers continued to consolidate and merge, independent poultry farmers found their negotiating power with large firms gradually diminishing. Attempts at increasing their leverage through the formation of associations and co-ops did little to stem this tide, and many farmers began to worry that their profit margins—which typically remained small even for major firms—were steadily on the decline. As such, during the 1980s, the number of independent poultry farms in Arkansas decreased from over 6,000 in 1980 to roughly 1,200 a decade later.”¹¹²

Integration and concentration are especially progressed in the swine and poultry industry. In the USA, the latter is the most vertically integrated of all industries. There the companies, also referred to as “integrators,” own or control breeding flock, hatcheries, chicks, assignment of baby chicks to growers, feed mills, feed ingredients, transportation of feed and processing (slaughter) plants.¹¹³ Information on the market price for live birds becomes insider knowledge traded only at firm level, so farmers find it difficult to judge the fairness of the prices they get from the integrator.¹¹⁴

The situation becomes aggravated if a region’s integrators stop competing with each other for “growers”. Growers encountering problems and dissatisfied with the terms and conditions from their integrator have little choice other than staying on because it is nearly impossible for them to find another integrator to accept them as contractors or collaborate with them under different arrangements.¹¹⁵ This means that from the growers’ viewpoint there no longer is such a thing as a free broiler market.

Income and risk distribution within the value chain

The distribution of income and risk within value chains is a crucial factor in the long-term survival of all partners involved. Due to unfavourable contract conditions (see below), the margin of producers often falls so low that it pays for the costs of inputs and hired labour but not or only partly for the labour provided by the family. This means that the producer household supplies its labour for free or below the minimum wage¹¹⁶ (see also the section *Investment specifications*). And if it gets worse, producers can no longer cover their costs.

While providing family labour for free is common on farms that purposely keep their investments low, it is not necessarily what farmers expect who have invested large sums in mechanization and automation.

¹¹² Riffel 2011.

¹¹³ MacDonald 2008; Taylor and Domina 2010.

¹¹⁴ Taylor and Domina 2010.

¹¹⁵ Taylor and Domina 2010.

¹¹⁶ Delforge 2007, Taylor and Domina 2010.

Changing laws and regulations

Livestock producers are constantly confronted with new laws and regulations, be it in the area of animal health and certification, biosecurity, food hygiene and sanitation, and environmental protection – to name only some of the target areas in the focus of legislators. The complying with such regulations often requires substantial investment. New environmental rules in Denmark, for example, have reduced the maximum stocking rate allowed per farm from 2.7 to 1.7 cows per hectare. This has encouraged the leasing and purchase of land, as farmers choose to expand their area rather than reduce their herd size¹¹⁷ – one of the reasons for the large debt loads described in the *Background*.

Waste disposal is another area requiring investment and adding to production costs.¹¹⁸ To control water pollution from pig farming, the Thai Pollution Control Department issued in 2001 a set of new rules. But up to 2007, only 1.36% of pig farms had been certified as implementing the measures because of the high costs involved. The cost was also the reason that few farmers so far have set up biogas systems, although they seem to be a useful way to deal with the slurry.¹¹⁹ According to some estimates, the enforcement of the environmental policies would probably reduce pig farmers' profits by about 5%, but only if they have sufficient land to spread the slurry on and use advanced manure practices. Otherwise the reduction would probably be greater than 10 to 15%.¹²⁰

Another issue is the way the costs for such investments are shared between producers and other players in the food-production chain. For contract farmers, the contract often forces the producers to shoulder the costs for any investments and actions needed to fulfil the law (see below).

Unfavourable contracts

A number of contractual issues can cause serious problems for farmers:

Investment specifications

Contracts often specify in detail how producers must keep and feed their animals, and what investments they must make to do this.

Farmers often have little choice other than to accept, even if this puts them under heavy financial constraint. Interviews with 26 contract farmers in Thailand in 2004¹²¹ indicated that the 19 poultry farmers among them had to invest on average about THB 488,000¹²² (then about US\$ 12,500) for buildings and an evaporation cooling system their contracting firm required. The pig farmers had to invest THB 650,000 (about \$16,500) – not counting some regular improvements needed on their farm. The average monthly net household income of the poultry farmers in this study was just THB 3,485 (\$90). With two workers per family, that meant the income per person was well below the average agricultural wage of THB 2,865 (\$75) in 2004.¹²³

¹¹⁷ Pat O'Keeffe at 27 March 2010, www.farmersjournal.ie/site/farming-Danes-burdened-with-massive-debt-10780.html (accessed 6 Feb 2012).

¹¹⁸ <http://www.naehrstoffboerse.de/data/Abgebenistguenstigersteuerzupachten.pdf> (accessed 1 April 2012).

¹¹⁹ Kukeawkasem 2009, p. 2.

¹²⁰ Gerber *et al.* 2006, cited in Kukeawkasem 2009, p. 34.

¹²¹ Delforge 2007, p. 13ff.

¹²² According to Delforge (2007), the exchange rate was 40 baht/1 US\$ (her field research was in July 2004).

¹²³ Delforge 2007, p. 13ff.

Cooperative members may also have to contribute to the expansion of their cooperative. The Board of Representatives of Arla Foods, for example, recently decided that members should support Arla's globalization efforts by doubling to 4.5% what the co-op calls the "Arla performance price" (the amount deducted from the farmers' milk income).¹²⁴ This is bound to add to the financial squeeze on Danish dairy farmers.

Duration of contracts

The duration of contracts can vary from just over a month up to 15 years¹²⁵ and perhaps longer. Short contract periods pose a risk for farmers having to repay the money they have borrowed for the investments prescribed by the integrator.¹²⁶ If the overall economic situation changes and the integrator decides, for whatever reason, not to renew the contract, the farmers end up with a load of debts they cannot pay back.¹²⁷

Payment agreements

Contracts sometimes guarantee the producers a fixed price for their products. This protects the producers against price changes and market failure, but also prevents them from gaining through price increases.¹²⁸ But often they receive no price guarantee, so carry the full risk if conditions change. Furthermore, many firms tie their payments to the efficiency of the producer and use a ranking system setting farmers against each other to determine the level of payments each individual receives.¹²⁹

Risk distribution

Depending on the agreement, the producer may end up carrying the full production risk, such as losses from disease, as well as the costs of complying with environmental, hygiene and sanitation rules.

Growers may also have to pick up the bill in times of crisis. Between 2006 and 2008 in Brazil, pork production costs exceeded the farm-gate price, but Sadia and Perdigão – two of the world's largest food companies – increased their annual aggregated gross profits by US\$ 1.3 billion.¹³⁰ In the USA, poor management led to the bankruptcy of Pilgrim's Pride Corporation and cost a few hundred growers their livelihoods. Pilgrim's Pride emerged from bankruptcy thanks to a \$800 million investment from its main stockholder, JBS, a big animal-protein company.¹³¹

¹²⁴ Arla Annual Report 2010 www.arla.com/upload/global/publications/pdf/arla2010uk_web.pdf (accessed 3 April 2012).

¹²⁵ MacDonald 2008.

¹²⁶ Delforge 2007, Taylor and Domina 2010, Food and Water Watch 2011.

¹²⁷ To help poultry growers in such situations, RAFI USA developed in 2005 a handout with recommendations www.rafiusa.org/pubs/20030709_poultry_handout.pdf (accessed 7 March 2012).

¹²⁸ Kukeawkasem 2009.

¹²⁹ Pew Commission 2008, Taylor and Domina 2010. For an example of a rating system, see Da Silva undated.

¹³⁰ Lundström 2011, p. 214.

¹³¹ Taylor and Domina 2010, p. 21, Food & Water Watch 2011. For information on JBS, see <http://www.jbssa.com> (accessed 1 April 2012).

Distribution of ownership

Contracts may define different ownership situations for live and dead animals¹³² which can have severe financial implications for the farmers if suddenly many animals die for whatever reason (see below).

Buyer's influence on a farm's efficiency

A farm's efficiency is often seen as a result of the producer's management and skills. While these undoubtedly vary, the company may also be at fault if a batch of broilers or swine comes out less well:¹³³

- The chicks or piglets for fattening may not be delivered on time to the producer, or the animals may be weak or ill.
- The fodder provided is not always of the same quality.
- The company staff who advise (and often also supervise) its producers vary in quality.

From asset to liability

To invest, farmers often need to borrow. Collateral for such a credit may be land and land titles, buildings, and in the case of landless producers, their expected income from their contract with the firm.¹³⁴

Repayment periods usually stretch over a number of years: sometimes up to 20.¹³⁵ This contrasts with the short-duration contracts that farmers frequently have with their buyers.

Indebtedness of farmers

Data on farmers' indebtedness are scarce. Those available reveal the following, very preliminary, pattern. Apart from individual differences, the extent of indebtedness largely depends on the context under which producers operate. In industrialized countries, more farmers tend to be in debt than in developing countries, and they owe more. Farmers who produce mostly or exclusively for the market are more likely to be in debt (and owe more) than those who are not predominantly market-oriented (though the latter may still produce and sell substantial amounts¹³⁶). Debt loads tend to be highest among contract farmers and co-op members. Some examples:

The Background has highlighted the high debt levels of US contract poultry growers (\$200,000 each) and Danish coop dairy farmers (€2.25 million). In a study of 30 dairy farmers in 10 countries in different continents, all six respondents from industrialized countries had some liabilities, while only nine of the 24 farmers in developing countries had some debts.¹³⁷

¹³² See, for example, Taylor and Domina 2010, p.28 (accessed 7 March 2012).

¹³³ Delforge 2007; Kukeawkasem 2009, p. 124; Taylor and Domina 2010.

¹³⁴ Delforge 2007, KIT and IIRR 2010, Taylor and Domina 2010, Lundström 2011.

¹³⁵ Taylor and Domina 2010.

¹³⁶ FAO 2009.

¹³⁷ Hemme and Otte 2010, p. 98. About half of the farmers in the study had been chosen because their dairy herd size came close to the national average, the other half because they were larger or represented different dairy production systems. The farmers came from Bangladesh, China, India, Pakistan and Vietnam in Asia, Cameroon,

In a study on pig farmers in northern Thailand, around 65% of them had debts averaging THB 240,000 (then US\$ 8,000)¹³⁸ (Box 6). This is less (in local currency terms) than the amount Delforge had found in 2004 in her study of 29 Thai poultry and pig contract farmers in central and northeastern Thailand in 2004. Their average debt load was THB 300,000 (then \$7,500).¹³⁹

Box 6. Debt levels among pig farmers in northern Thailand¹⁴⁰

According to Kukeawkasem's study of pig farmers in northern Thailand in 2007, debt levels vary with farm size, experience and the alliance the farmers have with other institution. The study interviewed 199 non-commercial and 289 commercial farmers. The latter consisted of 126 co-operative members, 80 contract farmers and 83 independent farmers.

About 65% of all **commercial farmers** had debts of THB 240,000 (then US\$ 8,000) on average, with bigger farms and farmers with less experience taking larger loans. Independent commercial farmers had less debt and lower interest rates than contract farmers and cooperative members. They were also more cautious in taking loans for expansion in a risky business environment.

Contract farmers usually took up a loan to get ready before the start of production. Co-op members, most of whom had small farms and followed traditional practices, had the highest debts as they were involved in many farm activities from various credit institutions available in their community.

Only 13% of the **non-commercial farms** had taken a loan. Their debts averaged only THB 44 (\$1.50) each.

But absolute debt amounts mean little as long as they are not related to a farm's overall situation. Farms in Germany carry an average debt load of about €120,000, about 18% of the farms' total assets.¹⁴¹ But this figure covers all types of farms, so may not be indicative of the debt levels of the dairy farmers and other livestock producers among the farms. According to the global dairy study by Hemme and Otte,¹⁴² the liabilities of German dairy farmers are a bit less than the overall figure, namely between 10 and 16% on total assets, while the liability shares of the farmers in the USA and New Zealand were between 20 and 40%. In the same study, all the smallholders in developing countries were operating their dairy farms with less than 10% liabilities – except in China; there the sample smallholder had more than 60% in liabilities.¹⁴³

Judged by such percentages, the financial situation of farmers may not always be as bad as their absolute debt amounts indicate. But in some instances, their debts are indeed dramatic, and so is the increasing tendency towards borrowing large amounts. This is especially the case for farmers whose buyers are (or would like to be) involved in international trade. That

Morocco and Uganda in Africa, Peru in Latin America and Germany, New Zealand and the USA – one small and one large farm per country except in India where 6 farms were studied (p. 96).

¹³⁸ Kukeawkasem 2009. The field research for this study was done between July and October 2007. During this period, the exchange rate fluctuated between 29 and 31 baht/ 1US\$ (<http://www.oanda.com/currency/converter/> accessed 31 March 2012).

¹³⁹ Delforge 2007; her study uses an exchange rate of 40 baht/1 US\$.

¹⁴⁰ Kukeawkasem 2009.

¹⁴¹ BMELV 2010, Table 184 on p. 158.

¹⁴² Hemme and Otte 2010.

¹⁴³ Hemme and Otte 2010. As the debt levels are taken from a figure on p. 99, it is not possible to give the exact percentages.

includes dairy farmers in China and Denmark, as well as poultry and swine growers in Brazil, Thailand and the USA. The average household debt of contract farmers in Delforge's study was about US\$7,500. This was more than ten times the national average for farming households already considered as heavily indebted.¹⁴⁴

The continuous advice to livestock keepers to grow is also worrying. Assuming that the liability share of a German dairy farm is between €60,000 and €100,000, then the amount of the credit suggested by the public advisors to dairy farmers in Box 4 would more than triple their existing debts. While in developed countries some economists have started to caution against taking on too much debt, the advice "you have to grow in order to survive" is now propelled around the globe.

Loss of flexibility

During the process of intensification, farmers mostly switch to higher-yielding breeds that are specialized and cannot fulfil the farmers' multiple needs. This situation has also implications for wider society, as the farmers often give up their local breeds and no longer act as their guardians.¹⁴⁵

Moreover, farmers often no longer own the animals they grow, and their contracts may restrict them from keeping any livestock other than those supplied by the contracting firm. Swine farmers in northern Thailand, for example, had to agree "*to raise no other animals, e.g., elephants, horses, cattle, ducks, chickens, or swine from other sources, etc., that may carry disease, in the swine farm or at any place nearby in order to avoid any spread of disease.*"¹⁴⁶

Both developments reduce the ability of farmers to react flexibly if the market changes. Their debt situation further compresses this flexibility.

The debt trap

The continuous investments needed to compete in an ever more specialized and demanding market drive weaker farmers, especially, into a debt spiral. Once in it, they have to continue to produce in order to repay their debts, and once the debts are repaid, they need to invest again – whether voluntarily or forced by their buyer – until they are trapped by market changes or unexpected problems.

During such a crisis, it is especially difficult to get new credits, or to sell the farm at a decent price.¹⁴⁷ Their high degree of specialization, generally viewed as an advantage and used by farmers to avoid risk,¹⁴⁸ becomes a burden as specialized livestock houses mostly are single-use facilities and have limited use in other agricultural operations.¹⁴⁹ US poultry growers, for example, "*are wed to their buildings, their mortgages, and their integrators through non-negotiable contracts and absent cash markets for their products. Once they enter with the*

¹⁴⁴ Delforge 2007.

¹⁴⁵ See Hoffmann 2011 for a discussion of the trade-off between livestock genetic conservation and economic development goals.

¹⁴⁶ Eaton and Shepherd 2001, p. 133.

¹⁴⁷ Kukeawkasem 2009, p. 123.

¹⁴⁸ See, for example, Kukeawkasem 2009.

¹⁴⁹ Taylor and Domina 2010, p. 9.

dream of entrepreneurship, they find themselves in the dogged trough of a life without exit... a life of true serfdom."¹⁵⁰

The debt spiral phenomenon together with the treadmill mechanism described in section *Drivers beyond demand* also helps explain why farmers continue to invest even during difficult times, as is presently the case for dairy farmers in Europe. In early 2010, some 2,000 dairy farmers from 17 European countries were interviewed during the annual EDF-Agri Benchmark Snapshot Survey. Many of them planned to invest within the next 12 months, mainly in barns and technologies for dairy production. Their intended investments differed from country to country – about €500/cow for UK farmers up to more than €2,000/cow in countries with higher production intensities (the Netherlands, Belgium, Luxembourg). Farmers also planned to stock up herd sizes – in Poland, the Netherlands, Denmark and Ukraine they envisioned increases of more than 5% annually.¹⁵¹

Loss of livelihood

As long as business goes well, farmers can continue. But if disease strikes, product prices fall, fodder prices rise, or something else unforeseen happens, farmers lose income and may not be able to pay back their debts. Some will give up, sell their farms and do something else; others go bankrupt – as reported from Denmark, where dairy farmers “are starting to see bankruptcies for the first time in 20 years”.¹⁵²

In places with many employment opportunities, dropouts from farming may be able to get other jobs. But this might be difficult where rural populations are growing, as in eastern, central and western Africa,¹⁵³ and where large percentages of the population are involved in livestock production. Under such circumstances, moving to the cities or emigration might be the only way to make a better living. Such movements can be quite substantial. Many of the nearly 425,000 pig farmers who gave up in Romania between 2003 and 2007 either shifted to the construction sector, or emigrated.¹⁵⁴ Such emigrants are often disadvantaged and have lower incomes and less access to welfare than native residents.¹⁵⁵

Implications of the financial squeeze for environment and public health

The increasing size and intensification of livestock production give rise to a number of environmental and public-health problems related to the growing amounts of manure, high animal densities and the concentration of production units in a relatively small area.¹⁵⁶ Small profit margins prevent many farmers from dealing with such problems appropriately. Financial stress, limited choices and lower farm-level decision-making ability produces

¹⁵⁰ Taylor and Domina 2010, p. 9. See also the PEW Commission 2008 and De Schutter 2011.

¹⁵¹ EDF 2010.

¹⁵² Pat O’Keeffe at 27 March 2010, www.farmersjournal.ie/site/farming-Danes-burdened-with-massive-debt-10780.html (accessed 6 Feb 2012).

¹⁵³ http://www.un.org/esa/population/publications/wup2001/WUP2001_CH3.pdf (accessed 2 April 2012).

¹⁵⁴ Doreen Carvajal and Stephen Castle: A U.S. hog giant transforms Eastern Europe, *The New York Times*, 5 May 2009, www.nytimes.com/2009/05/06/business/global/06smithfield.html?_r=1&pagewanted=all&_ga=2.111111111.111111111.111111111.111111111.111111111 (accessed 2 April 2012).

¹⁵⁵ Barcellos and Jardim 2007 in Lundstöm 2011, pp. 209-210.

¹⁵⁶ Delgado *et al.* 2008, Pew Commission 2008, Domina and Taylor 2010.

strong incentives for improper practices (Box 7),¹⁵⁷ in turn putting pressure on natural resources and leading to the improper disposal of waste and carcasses, and the misuse of antibiotics and other growth stimulants.

Box 7. Incentives for unethical behaviour

“Constrained choices for farmers will likely mean more – and more significant – unethical decisions regarding land, seeds, and labor. Agriculture is emerging as a place where ethically compromised positions could become natural for farmers, and perhaps mirror other businesses that have had ethical failures in recent years.

“With food as a basic builder of life, and with the potential for large scale environmental impacts from farming, it is perhaps time to turn attention to the ethical attitudes, proclivities, and behaviors of farmers.”¹⁵⁸

Improper waste disposal

With increasing size of operation and the concentration of many farms in one area, manure disposal becomes a problem. This is especially so in swine production, while chicken farms can often sell their manure.¹⁵⁹ Still, with increasing farm size, litter disposal remains a major issue confronting chicken growers too.¹⁶⁰

Practices with negative impacts on the environment range from dumping manure and slurry directly into waterways, to mistakes in manure application – too much, too frequently, at the wrong time.¹⁶¹ Larger, commercial farms are commonly regarded as more likely to invest in the necessary technologies to avoid such problems than are smaller non-commercial farms.¹⁶²

But larger farms can also be quite efficient at finding ways to bypass legal requirements. In Austria and Germany, slurry stock exchanges have developed where livestock producers who have excess manure and slurry can pass this on to farmers which have fields in need of fertilization.¹⁶³ Up to a distance of 50 km, such an exchange can be cheaper than other manure management solutions.¹⁶⁴ While such a system appears a transparent solution for the waste problem, it can also disguise improper disposal practices (Box 8).

While governments and livestock specialists continue to perceive smallholders as the main problem, the story in Box 8 raises the question of the role of governments in such scams.

¹⁵⁷ Hendrickson and James Jr. 2005, p. 289. See also Hirschauer and Zwoll 2008 for a discussion of incentives for malpractice.

¹⁵⁸ Hendrickson and James Jr. 2005, p. 289.

¹⁵⁹ Delgado *et al.* 2008, MacDonald 2008.

¹⁶⁰ MacDonald 2008.

¹⁶¹ Delgado *et al.* 2008, p. 63-64.

¹⁶² See, for example, Delgado *et al.* 2008, Kukeawkasem 2009, p. 107.

¹⁶³ <http://www.guellebank.de/> and www.guellebank.at (accessed 1 April 2012).

¹⁶⁴ <http://www.naehrstoffboerse.de/data/Abgebenistguenstigersteuerzupachten.pdf> (accessed 1 April 2012).

Box 8. Germany's Green Party sounds slurry alarm¹⁶⁵

Recently, a member of Germany's Green Party got hold of an internal letter that the Chamber of Agriculture had written in early 2011 to one of the Agricultural Secretaries of Lower Saxony, one of Germany's 16 States. The member noticed that the livestock numbers in the letter were based on figures from Germany's livestock insurance, which were much higher than the State's official statistics: namely 63.3 million broilers instead of 36.5 million, 17.9 million laying hens instead of 14 million, and 10.4 million pigs instead of 8 million. [If the insurance numbers are correct, then livestock densities in Lower Saxony would be much higher than those used by the government to plan policies.]

The letter also stated that presently it was not possible to monitor systematically on which fields the manure gets spread, as controls covered only about 2.5% of the area. Therefore it was not possible to confirm that all the manure accepted by the State's slurry exchanges is actually disposed of as shown in exchanges' records.

When accused of covering up such problems, the ministry responded that it was preparing a new state regulation for a reporting system enabling the tracking of slurry and manure.

[In short: The solution was to create more bureaucracy instead of improving a control system – a typical German response!]

Improper carcass disposal

As mentioned above, production contracts may define different ownership situations for live and dead birds. While live birds belong to the firm, the contractor “owns” the carcasses and with it the obligations to remove them promptly and safely.¹⁶⁶ In North Carolina, USA, for example, farmers have 24 hours to dispose of dead birds. This can be a financial and logistical problem if due to heat, natural disaster, equipment failure or disease, large numbers of poultry suddenly die.¹⁶⁷

Options in case of such a mass mortality include burial, landfill burial, composting, and three different types of treating the carcasses with heat. Each option has its own advantages and disadvantages in terms of costs and impact on environment and public health. Burial on the farm is probably the cheapest method, but can pollute the groundwater especially in low-lying areas with high water tables. Landfill burial and rendering may not be suitable for mass mortality due to disease.¹⁶⁸

In the absence of support, farmers with financial problems are likely to choose the option they can afford rather than the disposal method suited to the cause of mortality. This risk is especially large in export-oriented fast-growing economies, where the squeeze on farmers is growing but control systems are not yet well established and corruption not yet under control. Here dead animals may also end up in a secondary food consumption market,¹⁶⁹ a problem known also from developing countries in both intensive and low-input farming systems.

¹⁶⁵ Klaus Wallbaum: Grüne schlagen Gülle-Alarm, Hannoversche Allgemeine, 16 March 2012, www.haz.de/Nachrichten/Der-Norden/Uebersicht/Gruene-schlagen-Guelle-Alarm. The comments in the square brackets were added by the author.

¹⁶⁶ Taylor and Domina 2010.

¹⁶⁷ www.rafiusa.org/disaster/poultymortality.html (accessed 7 March 2012).

¹⁶⁸ www.rafiusa.org/disaster/poultymortality.html (accessed 7 March 2012).

¹⁶⁹ Delgado *et al.* 2008, p. 63.

Overuse of antibiotics and growth stimulants

Growing competition and small profit margins create strong incentives to use antibiotics, other drugs and growth stimulants to accelerate the growth of animals, enhance their production and suppress diseases.

Contractual arrangements further these tendencies by the company paying the farmer premium prices for efficient production. Several studies in India on contract farming illustrate the importance of such premiums for farmers' income. These studies found that contract farmers earned more because of the price premium, and not because they had achieved higher yields and/or lower production costs.¹⁷⁰ But price premiums are often based on unrealistic expectations and link the maximum payments to very short production periods and extremely low mortality and feed-conversion rates.¹⁷¹

In Europe, broilers have to be ready for pick-up in 35 to 43 days; this is much shorter than the 56 days broilers take under free-range conditions, the 81 days organic birds are allowed to grow,¹⁷² and the 84 days broilers used to take in the 1950s.¹⁷³

In fast-growing economies and developing countries, the fattening period is still a bit longer but gets shorter as the conditions for farmers in an area tighten. In Brazil, in 1980 it took contract poultry farmers of Pif Paf Alimentos seven weeks to grow a 1.8 kg bird, using 2.05 kg feed/kg weight increase. In 2006 these figures were 43 days for a 2.34 kg bird with a feed conversion of 1.83 kg/kg. The maximum price premium producers could obtain was linked to a feed-conversion rate of 1.9 kg fodder per kg weight gain.¹⁷⁴

Mortality rates to get the highest premium payments can be even tighter: 1% or less for both broiler and swine.¹⁷⁵ But such rates are far below the 5% mortality one can normally expect in broilers and sows.¹⁷⁶

Achieving such rates is hardly possible without the regular use of antibiotics or other growth stimulants, given the high density and large numbers in broiler and swine houses. Producers can either use such fodder additives and boost their income, or lose money and reputation as an efficient farmer. Thus it has been common practice for many decades to add low levels of antibiotics to the feed of animals in mass-production units.

Now that the side-effects of this widespread use of antibiotics are becoming obvious and costly, many countries in Europe have forbidden it as a fodder additive – with the result that the number of therapeutic treatments with antibiotics has gone up. A recent study in Germany investigated 962 poultry batches on 182 farms. It found that more than 96% of the broilers still received antibiotics in their short lives – 2.2 treatments on average. The 10% of the farms that did not use any antibiotics commonly had fewer poultry and took 45 days to get them ready for sale.¹⁷⁷ This indicates that the current regulations and control systems in Germany so far have been unable to curb the heavy use of antibiotics in highly intensive systems. In the

¹⁷⁰ Birthal and Kumar 2009, p. 1.

¹⁷¹ See Da Silva undated for the punctuation system Pif Paf Alimentos in Brazil uses for the establishment of the poultry prices it pays to its contract growers.

¹⁷² www.animalfarmlife.eu/hens_broilers_6.html (accessed 29 March 2012).

¹⁷³ Pew Commission 2008, p. 5.

¹⁷⁴ Da Silva undated.

¹⁷⁵ Da Silva undated, Eaton and Shepherds 2001, Annex 5 on pp. 134-135 contains a copy of a full contract for swine growers in Thailand

¹⁷⁶ Delgado *et al.* 2008, p. 63; according to these authors, under developing country conditions mortality rates per cycle are 5% for sows, 19% for preweaning piglets, 8% for layers, and 4% for dairy cows.

¹⁷⁷ LANUV 2011.

USA, the Food and Agriculture Administration is starting only now to address this problem.¹⁷⁸

What options for farmers in a financial squeeze?

What can farmers do to get out of the debt trap? Their strategies include:

- **Get an additional job outside of agriculture.** This is reported from contract farmers in Brazil¹⁷⁹ and the USA. Among US poultry growers, off-farm income accounts for nearly 80% of total household income on average for small broiler farms, and 34% of the total among very large farms.¹⁸⁰
- **Scale down and optimize the use of labour and local resources** rather than continuing to strive for maximum production. An example for this is a group of Dutch farmers who decided to put their dairy cows back on pasture and reduce the use of nitrogen fertilizers by applying manure.¹⁸¹
- **Diversify** by adding activities, such as keeping goats as a petting zoo, accepting visitors, and or selling some products on farm. The EDF-Agri Benchmark Snapshot Survey says that in the European countries it covers, farms with larger dairy herds were more diverse.¹⁸² When diversifying, farmers should balance labour- and capital-intensive operations, because otherwise they will not gain.¹⁸³
- **Target alternative markets.** A growing number of farmers are turning to this option, especially in developed countries.
- **Protest.** In Brazil 2,535 landless families were living on occupied land in 2008.¹⁸⁴ Lundström sees this as an inevitable consequence of the marginalization of family farmers through the current food regime.

Conclusions

A global technology race has started in the livestock sector. To join and stay in the race, increasing numbers of farmers especially in the North and some fast-growing economies are investing in new technologies and improved animals, and are linking up with companies and other buyers of their products through contract arrangements. Inclusive business models and other development approaches make it possible that small-scale farmers can also participate in and benefit from the livestock boom.

But for many, the long-term prospects look rather bleak. For them, their livestock threatens to turn from a multipurpose asset into a financial liability, driving them into continuous investment and a debt spiral. The financial squeeze they find themselves in forces them to cut

¹⁷⁸ Eleanor Fausold: FDA to begin restricting use of antibiotics in animal feed, *Nourishing the Planet*, 26 March 2012, <http://blogs.worldwatch.org/nourishingtheplanet/fda-to-begin-restricting-use-of-antibiotics-in-animal-feed/> (accessed 3 April 2012).

¹⁷⁹ Lundström 2011.

¹⁸⁰ MacDonald 2008.

¹⁸¹ Stuiver 2008, Krijgsman 2011, and <http://www.duurzaamboerblijven.nl/> (accessed 2 April 2012)

¹⁸² EDF 2010.

¹⁸³ Reil 2009.

¹⁸⁴ Lundström 2011, p. 224.

costs wherever they can, and creates strong incentives to unethical behaviour. Their liabilities become a problem when the conditions under which the investments were made change. They may no longer be able to repay their debts, and go out of business.

Policymakers, scientists and development professionals tend to accept high drop-out rates of producers as a natural consequence of the economies of scale and reduced labour requirements through new modes of production based on modern technologies and computer-aided management.¹⁸⁵

While it is difficult to negate the importance of these factors and influences, this view overlooks the enabling institutional framework and political support that for nearly a century have furthered the development and spread of technologies and innovations in livestock breeding and production.¹⁸⁶ It also blends out the implications that replacing labour and skills with technology and energy have on the environment, public health, culture, and the well-being of people and animals – and the fact that society, rather than the industry, has to cover the costs of dealing with such issues.

An approach to intensification that relies heavily on new technologies and external inputs is questionable, especially in regions where other industries are unlikely to absorb increased drop-out rates from the agricultural sector and the number of people in rural areas will continue to grow.

Policymakers should ensure that their policies do not make the negative aspects of the livestock revolution a self-fulfilling prophecy. Small-scale farms who rely mainly on family labour and keep their investments and external inputs low can be quite cost-efficient, and even make proportionately higher profits than larger farms. They often are also more environmentally friendly than large farms. But they need an enabling institutional framework and infrastructure and regulations conducive for local and regional marketing, away from export-oriented production schemes. This means legislation that prevents market consolidation and ensures fair conditions for smallholders and starts with the recognition of their human and other rights.

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¹⁸⁵ See, for example, Gerber *et al.* 2010, p. XII.

¹⁸⁶ Hounkonnou 2012.

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