



Forage-livestock policies designed to improve livelihoods in Western China: a critical review

Forage-livestock policies

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Colin Brown and Scott Waldron

*School of Integrative Systems, The University of Queensland,
Brisbane, Australia*

Liu Yuman

*Rural Development Institute, Chinese Academy of Social Sciences,
Beijing, China, and*

John Longworth

*School of Integrative Systems, The University of Queensland,
Brisbane, Australia*

Abstract

Purpose – The purpose of this paper is to show how the promotion of integrated forage/ruminant-livestock industries forms a key plank in efforts to improve rural household livelihoods in Western China.

Design/methodology/approach – The paper critiques how this industry development has proceeded in the case of Qingyang prefecture in Gansu. The way in which the industry policy has manifested from central to local levels of government is outlined along with how the industry policy relates to other measures intended to improve household livelihoods.

Findings – The outcomes of this forage-livestock industry policy do not always match the intention, and the paper examines the various disconnects that arise between government agencies, government and households and households and the market. The foremost challenge for policy makers is in connecting households and markets.

Originality/value – Identifying the impacts of policy and institutional settings associated with forage-livestock systems is crucial if improvements are to be made and as these systems become more widespread in Western China.

Keywords Forage crops, Livestock, Agriculture, Rural areas, China

Paper type Research paper

Major infrastructure programs are transforming the rural areas of Western China by constructing new towns, health and education facilities, power and water, and road networks. Multi-dimensional programs are also systematically developing rural villages. Despite the sweeping changes, many households in rural areas of Western China remain

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in poverty and generate a significant proportion of their income from agriculture. Consequently, efforts to improve household incomes also involve the aggressive promotion of particular agricultural industries, or so-called “pillar” industries.

As in other parts of China, this development approach is based on the “one body, two wings” system in which the “healthy body” (through the provision of basic services and welfare) is supported and allowed to take flight through the one “wing” of training and education and the other “wing” of opportunities afforded through development of particular industries. The focus of this paper is on the latter “industry” wing. The specific case being investigated is the promotion of integrated forage-livestock activities, in particular the promotion of lucerne growing and cashmere production, in Qingyang prefecture which lies on the loess plateau in the East of Gansu province (Figure 1). A large population relative to its resources means that rural per capita incomes in Qingyang, where the average was Rmb2,030 in 2007, are among the lowest in China[1].

The widespread nature of the forage-ruminant livestock push across the semi-pastoral/agricultural areas[2] of Northern and Western China – from Yili prefecture in the far West of Xinjiang to Chifeng city prefecture in Eastern Inner Mongolia, and with numerous prefectures such as Qingyang in between – warrants a critical review of these developments. The following section overviews previous integrated forage-livestock industry development in Qingyang, while Section 2 sets out the policy framework for the current industry development. Although there is widespread support for promoting integrated forage-livestock systems, translating the intentions into outcomes is compromised by disconnects between government agencies, government and households, and households and the market. The nature of these disconnects and the means of resolving them are discussed in turn in Sections 3-5.



Figure 1.
Map of Gansu province,
Qingyang prefecture
and Huan county

1. Livestock industry development

China has been actively developing livestock industries and has sought to increase livestock's share of total agricultural output (Waldron *et al.*, 2007). The intention is to change from staple grains to livestock activities that are perceived to produce more lucrative outputs and that allow for better utilisation of farm resources[3]. Brown *et al.* (2008, Chapter 6) describe how efforts to deal with grassland degradation in semi-pastoral areas have led to the intensification of livestock systems and the development of forage and on-farm feed sources[4]. There have also been high-level calls from research and government sectors to expand forages across China to increase income opportunities for farmers and to improve grain security in China by providing alternative less-grain-intensive livestock feed systems (Liu, 2008; Zhou, 2008).

The developments that have occurred in other Western parts of China are reflected in Qingyang where an emphasis on non-ruminants pre-1990 has shifted to ruminant animals since 1990. Indeed, Qingyang provides particularly useful insights as it is situated at the interface between agricultural and pastoral areas which has been the focus of many of the policies and programs targeting forage-livestock systems and intensification of ruminant livestock systems. Gansu had 1.1 million hectares of improved pasture in 2007 of which 0.47 million hectares was lucerne. Gansu is the largest lucerne producing province in China while Qingyang is the major producer of rain-fed lucerne in Gansu. In the dry and variable climates of central and Northern Qingyang, forage crops are considered more suited than grain and other crops. Indeed, the current measures are not the first attempt to develop integrated forage-livestock systems in Qingyang, as such systems have been trialled since the 1980s and actively promoted by officials since the early 2000s. The relative importance of Gansu province, Qingyang prefecture and Huan county in Chinese agricultural and livestock production and employment is highlighted in Table I. Gansu contributes only around 1.3 percent of the value of Chinese agricultural production although it accounts for 2.3 percent of rural employment in China. Qingyang prefecture accounts for about 10 percent of the value of agricultural production, rural and farm employment, ruminant livestock turnoff and grain production in Gansu, while Huan county accounts for around

	China	Gansu province	Qingyang prefecture	Huan county
Gross value of agricultural production (million Rmb)	4,889,300	64,626	5,821	480
Gross value of animal husbandry production (million Rmb)	1,612,490	15,311	1,195	182
Cattle turnoff (thousand)	43,595	1,397	158	6
Sheep and goat turnoff (thousand)	255,797	8,335	965	263
Meat output (thousand tonnes)	68,657	925	66	10
Wool output (tonnes)	363,470	22,365	678	291
Grain crop production (thousand tonnes)	501,603	8,244	881	38
Rural labourers (thousand)	476,400	10,956	1,169	165
Rural labourers in farming, forestry, animal husbandry and fishery (thousand)	314,440	7,414	832	129

Sources: China Statistical Bureau (2008a, b); EBCAHY (2008)

Table I.
Selected agricultural
statistics for China,
Gansu province,
Qingyang prefecture and
Huan county – 2007

one-sixth of the value of animal husbandry production, meat output, and rural employment in Qingyang.

To provide a more detailed local perspective of developments occurring in forage and livestock industries, Table II outlines key forage and livestock indicators over the 2000-2007 period for Huan county which is a dry county in Northern Qingyang prefecture where forage-small-ruminant systems are being targeted. Perennial forages such as lucerne have more than doubled in area between 2000 and 2007. Although the accuracy of these official statistics and the extent to which they reveal the productivity of perennial forages is questionable, and difficult to estimate given the topography and yearly variations, it is apparent that the current push builds on an already substantial increase in perennial forages. The livestock statistics indicate that while the number of large animals, and in particular cattle, has not changed over the 2000-2007 period, they are being turned off at a younger age. Related statistics on mid- and end-year numbers indicate that fewer animals are being over-wintered, a trend consistent across all ruminant livestock in Northern China as highlighted in Waldron *et al.* (2007) and Brown *et al.* (2008, Chapter 6). Table I reveals that sheep and goat numbers fell in the 2000-2006 period but increased by almost a third in 2007. This partly reflects the emphasis on cashmere goats in 2007 with numbers set to increase again in 2008. Unlike large ruminants, small ruminant turnoff has not increased even with the large jump in numbers in 2007 due to the build-up phase and desire to hold onto livestock replacements, as well as the move into cashmere goats which are not turned off on an annual basis. The switch to ruminants is reflected in the constant pig numbers and the decline in chicken numbers by two-thirds. Overall meat production in Huan county has increased in line with the higher large ruminant turnoff. According to official estimates, livestock production value in Huan county has more than doubled in real terms over the period, while the average net income per capita from livestock has increased from Rmb309 in 2000 to Rmb598 in 2007.

A range of specific programs and measures are used to try and achieve these targets including: free or subsidised forage seeds; subsidised cutting machines, silage and harvesting equipment for larger farms; loans and subsidies for livestock pens, fencing, and the purchase of breeding livestock; and financial support for livestock and forage processing enterprises. More importantly, these specific programs and measures form part of a matrix of wider more general programs and measures shown in Figure 2 and discussed in more detail in Section 3.

The growth in ruminant livestock numbers has not been without problems and especially environmental problems such as severe grassland degradation in pastoral and semi-pastoral areas. The policy response has not been to moderate the livestock targets but instead to implement various forms of grazing restrictions and to focus on more intensive forage-ruminant livestock systems (Brown *et al.*, 2008, Chapter 6). The attention on these forage-livestock systems to address both environmental and household livelihood objectives merits an investigation into how effective they are in achieving these objectives.

2. Policy measures

A large population relative to its natural resource base has seen Gansu consistently rank as one of the poorest provinces in China. Alleviating poverty in Gansu, therefore, has been a high priority for the Chinese Government[5]. In 2008, there

Units	2000	2001	2002	2003	2004	2005	2006	2007
Perennial forage area	55.77	58.90	79.60	93.80	99.50	105.00	103.00	125.00
Annual forages planted/year	30.53	6.68	15.00	20.00	15.00	20.00	21.48	24.00
Large livestock in stock	11.18	11.40	11.79	12.06	12.00	12.00	12.61	12.94
Large livestock turnover	1.22	1.40	1.09	1.54	2.79	3.02	3.16	3.25
Sheep and goats in stock	57.07	46.47	47.52	47.96	47.70	47.30	47.75	63.95
Sheep and goats turnover	22.67	22.40	25.00	25.80	26.36	26.00	26.20	26.32
Pigs in stock	7.46	6.11	5.86	6.24	6.00	6.00	6.11	6.01
Chickens in stock	43.43	39.67	42.94	48.34	11.51	12.00	15.07	16.12
Meat production	8,960	1,052	9,166	10,262	12,005	12,073	12,423	12,590
Livestock industry production value (2007 prices)	122	131	155	169	179	236	248	248
<i>Net income/capita from livestock industry</i>								
Current prices	309	324	325	382	386	414	430	598
2007 prices	361	376	378	438	422	442	453	598

Source: Huan County Statistical Yearbook (various issues)

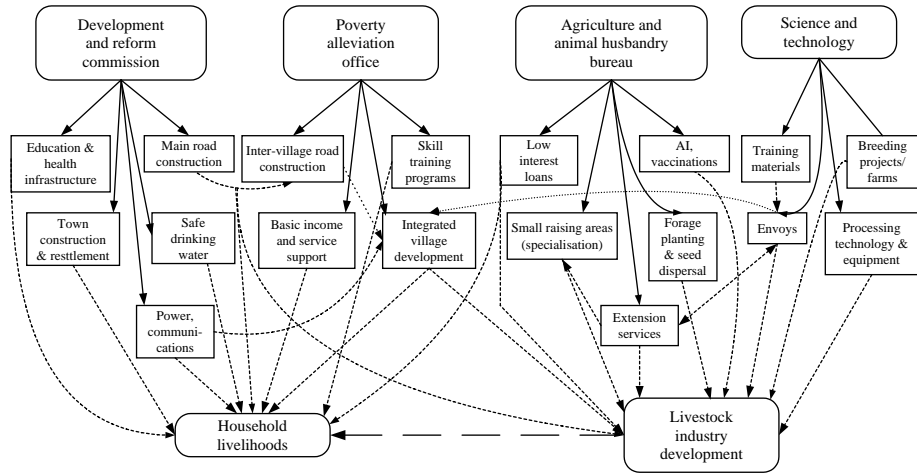


Figure 2.
Agencies and programs
addressing rural
household livelihoods
in Qingyang prefecture

were 8,790 poverty-stricken villages in Gansu. In Qingyang prefecture, seven of the eight counties/districts are national-level poverty-declared counties (including Huan), while the remaining county is a provincial-level poverty-declared county. Some 49 townships in Qingyang are the focus of poverty-alleviation work including all townships in Huan county.

At the National People’s Congress in 2007, Premier Wen Jiabao called on Gansu to increase farmers’ incomes to reach the 2007 national average by 2012. As the national average rural per capita incomes in 2007 was Rmb4,140 compared with only Rmb2,329 for Gansu, this target means an almost doubling of farm incomes in Gansu by the year 2012. Document No. 32 entitled “Raise 6 action plans to increase incomes” was issued, in which expanded ruminant livestock numbers were listed second on the action plan for increasing incomes. The Agriculture and Animal Husbandry Bureau (AAHB) under the Ministry of Agriculture (MoA) was to take the lead in the action plan, but the plan incorporated other agencies such as the Ministry of Finance, the Ministry of Science and Technology (S&T), and the Poverty Alleviation Office (PAO)[6].

The call by Premier Wen initiated a series of responses in Gansu. In particular, ruminant livestock were given a much higher priority as a means of raising rural incomes. The targets for cattle turnoff in Gansu were increased dramatically from 1.52 to 2.4 million and sheep and goats from 9.8 to 23 million over the 2008 to 2012 period. The turnoff age for ruminant livestock was targeted at 1.5 to two years of age for cattle and three to six months old for sheep. A feature of these ambitious targets was that they related to increasing the quantity rather than the quality or value of livestock.

Qingyang was singled out for special attention. The Gansu Party Secretary organised a group of four experts in animal production, grasslands and crop science from Lanzhou University to visit Qingyang to devise strategies and agricultural activities to improve farm incomes and to deal with the prolonged period of dry seasons occurring in Qingyang.

The outcome of these edicts and visits in Qingyang was the initiation of a “Six Millions” project. Three important components of this project were the setting

of three ambitious prefectural targets to be achieved by 2012: five million mu[7] of lucerne (there was 2.8 million mu of lucerne in 2008), one million beef cattle (780,000 in 2008) and three million cashmere goats (2.4 million in 2008). Sheep and goats were targeted for Northern Qingyang with beef and dairy cattle in the South[8].

These prefectural targets have manifested themselves in Huan county as a “Double Millions” project involving an increase in goat numbers from 400,000 to two million and the sowing of two million mu of lucerne. Incomes are targeted to increase by Rmb1,500 from the forage livestock systems. The project and accompanying measures seek to change the ratio of the areas sown to cereals, cash crops and forage crops from a ratio of 4:3:3 to a ratio of 2.9:2.9:4.2. Around 0.5 million mu of lucerne is to be planted annually with 18 demonstration areas having more than 10,000 mu, 44 demonstration areas having more than 1,000 mu and 250 demonstration areas of 100 mu. The Huan County Government has requested that every township have at least one administrative village with 20 households that have 30 mu of lucerne/sown pasture and 30 cashmere goats and with household incomes in excess of Rmb10,000.

Apart from the need to ensure adequate fodder, the livestock targets have also elicited measures to ensure sufficient drinking water for livestock, to increase livestock pens and sheds for over-wintering, and to change livestock herd/flock structures to turnoff younger animals. Local governments in poor areas such as Qingyang lack the financial resources to heavily subsidise agriculture and there is a heavy reliance on funding from higher levels of government for many of these measures. In Huan county, funds of Rmb5.3 million have been provided under the forage-livestock action plan (funded primarily by the provincial level but also by the prefecture) with around Rmb1 million for breeding, Rmb1.9 million for silage and Rmb1.5 million for specialised raising areas.

Although the level of funding and attention highlight the priority given to the development of forage-livestock systems and improving household livelihoods, the effectiveness of these funds and programs in improving livelihoods is another matter. The following three sections examine this effectiveness and some of the obstacles to achieving the desired outcomes.

3. Connecting government agencies

As mentioned, there are many agencies and programs involved in promoting rural development, improving livelihoods and alleviating poverty in poor areas such as Qingyang, with the key agencies and programs shown in Figure 2. Most attention in discussing development in Western China focuses on either the infrastructure and poverty alleviation programs (left-hand side of Figure 2) or on specific agricultural programs (right-hand side of Figure 2). However, Figure 2 shows that an intricate web exists between these seemingly disparate programs and policies and the agencies that govern them. Ensuring that this interaction comes together in a way that improves the livelihoods of poor households is a crucial aspect of policy co-ordination.

In discussing the relative importance of the various agencies and programs, it must be noted that expenditures by the Development and Reform Commission (DRC) on infrastructure and by the PAO on poverty alleviation dwarf the amounts spent on agriculture or livestock industry development. For instance, DRC infrastructure spending in Huan county alone of Rmb150 million per annum compares with Qingyang prefecture-wide PAO expenditures on forage-livestock projects of Rmb10

million per annum, S&T expenditures of Rmb250,000 per annum and negligible AAHB expenditures on forages and livestock. However, the policy measures outlined in Section 2 will increase expenditures in the forages and livestock area. That is, the measures outlined in Section 2 will require Qingyang prefecture to contribute around Rmb20 million per annum to the three pillar industries (lucerne/livestock, fruits, and vegetables/melons), while Huan County Government will spend Rmb4 million on agriculture in 2008.

In general, the agencies shown in Figure 2 are connected to some extent especially where there are strong top-down directions or edicts to which they are all expected to conform in areas as important as household livelihoods. Synergies operate between the DRC and PAO on the one hand, that have the funds and power but not the human resources, and the AAHB on the other hand, which has a sprawling network of extension officers at a local level but which is severely resource constrained. Nonetheless, inconsistencies across programs and agencies do occur. The sheer number of programs and agencies involved in areas such as poverty alleviation and village development raises concerns over the disbursement and fragmentation of scarce development funds over a plethora of programs and agencies. The agencies and programs all have different foci even if ultimately they all aspire to improve household livelihoods, and it is the multiplicity of objectives and means of achieving it that without careful co-ordination can impact adversely on the over-arching intention. As is highlighted in reports such as those by the China Development Research Foundation (2009, Chapter 5), co-ordination, management, fund disbursement, effective supervision and related problems are an especially important aspect of effective of poverty alleviation programs in China.

The massive infrastructure programs of the DRC will have indirect impacts on structural adjustment and income and employment generation. However, the skills and financial resources of poorer households often preclude them from taking on more lucrative opportunities created by these projects. Thus, improving the skills and access through related programs targeted at these poor households is a crucial aspect associated with these indirect impacts. The construction of new roads, market facilities, and communication services also influence livestock industry development, and the extent to which livestock industries can contribute to rural development and household livelihoods.

The Integrated Village Development approach of the PAO was trialled initially in 1998 in ten administrative cities in Gansu and has since been rolled out through most of China. The approach involves decisions made at the village level as to what is needed most to develop the village, whether it be a road project, establishment of an enterprise or some form of agricultural industry development. As such, the integrated village development has strong ties with the training, extension and support provided by the MoA as well as by S&T (Figure 2). The PAO is also involved in providing basic skills to enable more off-farm and outside region opportunities and to facilitate transport for household members to engage in this off-farm work[9]. Apart from the PAO, labour training programs are also run by other agencies including the MoA (Sunshine Project), Ministry of Labour and Personnel (Yilu program) and the Women's Federation. Once again, the multiplicity of programs and agencies involved creates governance and co-ordination problems of the type discussed by the China Development Research Foundation (2009, Chapter 5).

The AAHB plays the dominant role in agricultural industry development. For ruminant livestock industry development, this involves building up the production base both of the ruminant livestock and the necessary animal fodder as shown by the range of measures in Figure 2. This draws on specialists and divisions with knowledge in diverse areas such as animal production, agronomy, livestock feed, and livestock diseases. The challenge is in having these specialists and divisions contribute from a systems-based perspective rather than in terms of their more traditional disciplinary-based approach. Strong direction and co-ordination from county governments is crucial in ensuring a consistent and co-ordinated set of approaches and messages from the diverse agencies and disciplinary groups. The merging of the Agriculture Bureau and Animal Husbandry Bureau in Gansu in the second half of the 1980s has enabled better integration of forage and livestock systems.

The AAHB is also active in encouraging local level specialisation in the form of establishing so-called “small raising areas” which facilitate a concentration of households engaged in similar activities. The DRC and S&T are also involved in this initiative. Although other agencies are associated with developing training materials and skills, only the AAHB – with its vast network of administrative and extension systems down to township level – can facilitate local extension services needed to support households take up these new industries. No formal extension officers operate below the township level, although there are village level technicians with local knowledge especially in fields such as livestock diseases and breeding. The lack of skilled extension officers at the village level has also seen governments encourage the development of village-level producer associations to fill this technical extension void as well as to address marketing issues raised in Section 5.

A significant gap also exists between research agencies (such as the academies, universities, and colleges) and official extension agencies that operate within the AAHB[10]. The S&T bureaus and divisions at the different administrative levels facilitate some interaction, but a strengthening of the science-policy-extension linkage could yield considerable benefits. The following section highlights some of the problems confronting rural households in adopting forage-livestock systems with the need for more precise and complex farming systems on the one hand but with their limited skills and resources on the other hand. Researchers need to be acutely aware of the limitations of these household skills and resources to ensure the relevance of their research to these new farming systems, while on-farm research or at least closer liaison between researchers and extension workers is needed to demonstrate the benefits and feasibility of the new systems to households and hence encourage their adoption.

4. Connecting households and government

Irrespective of how well government agencies are co-ordinated, these agencies must connect with the intended recipients of their various programs if the programs are to be effective. That is, the outcome of agricultural industry support programs depends on the uptake by households and how they perceive returns, risks and other impacts on their livelihoods. The government attempts to change systems and attitudes initially through administrative “promotion” or by influencing or coercing farmers. Often, this is accompanied by financial support and the provision of free services, especially as farmers normally require the benefits of the technology to be demonstrated first and because of limited access to credit. Ultimately, however, the new activities or practice

changes must be self-sustaining and generate ongoing economic returns and livelihood benefits to farmers. Getting the balance and timing of these administrative “promotion” efforts, financial support and household incentives right is critical in sustaining these programs, as evidenced by the previous failed attempts to develop integrated forage-livestock systems in Qingyang.

For most farmers, the integrated forage-livestock systems involve significant changes to the traditional annual cropping systems. Issues associated with establishment of perennial lucerne and the optimal harvesting time, pose new and more complex decisions than do those associated with annual crop cycles. Integrating these decisions with the feeding and management of livestock greatly increases the level of complexity.

Although research into lucerne and cashmere suited to Qingyang is ongoing, and despite some disconnect between the science and extension agents mentioned in Section 3, there is a significant amount of agronomic and animal production science knowledge available that identifies “best practice” solutions. The real problems relate more to how to connect this scientific knowledge into household decision systems and frames of reference. Official extension systems through the AAHB with their grass roots connections notionally are capable of doing so but lack the personnel, time and other resources to do so on a regular and ongoing basis. On-farm research at a village or group level enhances the relevance of the research and provides for more immediate demonstration effects but is not widely or systematically practised. Thus, little capacity exists to determine technically efficient activities for individual households let alone economically efficient outcomes for what are very different systems from traditional cropping systems.

While lucerne and cashmere were selected as a response to ongoing drought conditions, and although potentially more lucrative than the traditional activities if managed properly, they pose different risks to those that the households have encountered and managed before. The prospect of forage establishment failure, livestock disease, and market uncertainties (outlined in next section) embody significant risks for households. Larger households are better able to withstand the negative effects of drought or low-livestock product prices than are small households which face potentially large production and price risks in adopting the new and more specialised forage-livestock systems.

The current push involves not only a move into activities such as lucerne and cashmere but also an increase in the scale of production (to at least 30 goats and 30 mu of lucerne per household). The current scale of production is extremely small with only 300 households raising more than 50 head of livestock in Qingyang. Integrated forage-livestock systems may enable small households to make better use of complementary or underutilised farm resources. However, as scale increases these complementarities may diminish as household labour and other resources become stretched. Under these circumstances, outsourcing of specialised operations such as fodder harvesting and livestock handling need to be considered and become more important. Furthermore, the dramatic move into lucerne production may alter relative feed prices to the extent that it favours specialised livestock producers (buying in feed) over integrated forage-livestock operations. Chavas (2008) also highlights how specialisation can be a response to managing complexity in decision making, and this may be relevant here given the nature of forage-livestock systems and the level

of household skills. Indeed, the extent to which integrated forage-livestock systems should be implemented on a household or at a local area or village basis is a moot point. In any event, future extension and technical support programs and efforts to modify industry structures must be cognizant and connected with household resources, skills, access to credit, and frames of reference.

5. Connecting households and markets

While disconnects between government agencies and between governments and households are two major concerns, the primary obstacle to achieving the desired outcomes of agricultural industry policy are “disconnects” with markets. Disconnects with markets occur not only with households but also with policy makers. For emerging industries serviced by relatively few traders in areas such as Huan county, aggressive industry policies can adversely impact on household incomes through local surpluses and depressed local prices. Small households do not have the cash flow flexibility to enable them to hold stocks and so are dependent on spot markets and are vulnerable to sharp market downturns. In decisions about pillar industries, relatively little account is taken of what is happening outside of the area in question (namely, in other counties, prefectures, and provinces). In the case of cashmere, awareness of market and production developments in Inner Mongolia, where most of the cashmere is grown in China, is essential.

Another price-related risk or distortion arises in the early stages of policy-induced rapid industry growth. Attempts are made during these stages to build up herds or flocks very quickly with retention of breeding stock and females. Forage seed stocks and services associated with these activities are also traded at a premium during these periods. These high initial returns are a lucrative activity for well-positioned households or local areas. They become problematic, however, when longer term decisions or strategies are based on these temporary high returns. That is, decisions by both policy makers (in determining suitable activities to promote) and households (in terms of mix of farm activities) should be based on steady-state conditions rather than on prices prevailing during the initial industry build up. A production risk also arises in that inferior or unsuitable livestock are often sold in periods of rapidly rising demand for breeding stock. Smaller households bear the brunt of both these risks, namely having to buy inferior livestock at above normal prices.

A significant disconnect arises between the prices farmers receive and the value that consumers place on the products these farmers could potentially produce. Traders throughout Northern and Western China usually deal in a range of livestock and agricultural products and possess much greater and more accurate information on agricultural product prices than do farmers[11]. This asymmetry of information is exacerbated in the case of new or unfamiliar products for farmers. Furthermore, traders often purchase products on a mixed average grade basis blurring the price signals that farmers receive. This failure of the traders to pay prices that signal to the producers the true values end-users place on different grades/types of products has elicited policy responses such as the promotion of agro-industrial enterprises and contract farming. A close link also exists between agro-industrial enterprises, rural development, agricultural modernisation and agricultural industry policy. The agro-industrial enterprises provide the conduit to higher value markets as well as potential revenue and employment bases for local government, while the industry

policy is used to develop the production bases to ensure sufficient raw material supply for the enterprises. However, Brown *et al.* (2008, Chapters 5 and 7) highlight problems with many of these agro-industrial enterprises in Western China in terms of low-capacity utilisation, chronic losses, and poor management. In order to generate revenues under these conditions, the agro-industrial enterprises sometimes enter into unscrupulous practices in processing the product and in their input procurement from small households. Propping up these unviable agro-industrial enterprises also creates serious market distortions not to mention high opportunity costs from a development perspective. Thus, close scrutiny of these agro-industrial enterprises needs to occur both in their design and implementation phase as well as ongoing assessment of their performance in enabling small households access higher value markets.

Another approach to connecting small households with higher value markets has been through the support of associations, co-operatives or specialised groups of producers[12]. The small size of households makes it difficult to achieve the uniformity and reliability required by higher value markets or to realize the size economies associated with various production practices. China has promoted associations, co-operatives, specialised areas, and other producer groups in recent years to overcome this problem and to achieve gains from collective activity in product markets (Brown *et al.*, 2008, Chapter 5 and Section 7.2.5). Yet of the 54 agricultural producer associations in Huan county only eight are for livestock. Furthermore, the livestock associations serve little more than as a collective sourcing point for select traders.

To operate effectively, these producer associations require the business acumen, negotiation skills, information, and market intelligence to fully understand the characteristics and nuances of the higher value markets into which they are selling. They also require the liquidity and access to finance needed to operate effectively in these higher value markets. Government initiatives to develop these skills, capabilities and financial resources may have a greater impact on raising farm incomes than supporting unviable agro-industrial enterprises.

6. Concluding remarks

The multitude of small, poor households in Western China dependent on agriculture ensures that the active promotion of selected agricultural industries remains a key plank in policy efforts to improve household livelihoods. The manner in which such policies are implemented at the “grass-roots” in modern China has been outlined in this paper in the case of integrated forage-livestock systems in Qingyang prefecture of Gansu.

Providing a consistent and effective policy response poses major challenges. First, there needs to be a high degree of co-ordination between industry development, the construction of infrastructure, and the provision of basic services. Second, the integrated systems required to implement these policies may cut across traditional agency lines. In general, however, the vigour with which the industry policy has been pursued has garnered a level of direction from key officials to ensure inter-agency co-operation.

Integrated forage-livestock systems do offer potential both for efficient utilisation of diverse household resources and for the dry and variable climate in Qingyang. But, realisation of this potential requires a level of precision in household decision making that may not be available, and also shifts households away from semi-subsistent food

production systems with significant implications for access to credit and the management of risk. Thus, successful implementation of forage-livestock systems require extension and support services cognizant of, and tailored to, the skills and resources of existing households.

The potential failure of the government agencies to co-ordinate their efforts and the difficulties these agencies encounter in endeavouring to connect with the poor households the policies are designed to help, are two major general obstacles to achieving the over-arching policy goal of improving farm livelihoods. However, the most serious and most overlooked problem is the disconnection between households and markets. Organising small fragmented production units so as they are able to engage in markets that require consistent, reliable and uniform supply is no trivial matter. Questions remain over the desirability and capability of the Chinese Government to pick agricultural “pillar” industries that will eventually become self-sustaining and viable in selected areas. However, presuming the government will continue to attempt to do so, it is increasingly important that policy-makers recognise the potential for the three major types of “disconnects” discussed in this paper – especially the householder-market disconnection – to seriously jeopardise the best intentions of policies designed to raise rural livelihoods.

Notes

1. In Qingyang, at the end of 2007, around 153,800 people were classified as being in absolute poverty (per capita incomes less than Rmb728) with a further 327,700 people classified as being low income (per capita incomes between Rmb728 and Rmb1,015).
2. A map showing the widespread distribution and location of these semi-pastoral areas appears in Longworth and Williamson (1993, Plate 2).
3. The 11th Five Year Plan (2006-2010) targets the livestock sector to increase its share in agricultural output value from 34 percent in 2006 to 50 percent by 2010 (EBCAY, 2006), although the assumptions on which these projections have been made have not been made explicit and appear unrealistic.
4. This “Han” approach to development of the grasslands, namely to plough up “unproductive” natural grasslands and sow down more productive forages and crops, has been at the heart of the pasture degradation problem since the Opium Wars in the 1840s and 1850s (Longworth and Williamson, 1993, p. 238).
5. In 2008, 86 counties in Gansu formed part of the National Poverty Alleviation Network of which 80 counties were poverty declared to one degree or another.
6. In 2006, Rmb1.3 billion was provided for poverty alleviation in Gansu, mainly from the central government. Around Rmb700 million was provided through the PAO, with additional funding through the Ministry of Civil Affairs, the Development and Reform Commission and the Ministry of Science and Technology.
7. The area unit mu is equivalent to one-fifteenth of a hectare.
8. Specifically the Northern counties of Huan, Huachi and Qingcheng were targeted for sheep and goats, while the Southern counties of Zhenming, Ning, Heshui and Xifeng were targeted for beef cattle, with He county also in the South targeted for dairy cattle.
9. Around two million rural people in Gansu work off-farm each bringing about Rmb10,000 per annum to their households. There are a further four million involved in seasonal off-farm employment including 300,000 who work on cotton farms in Xinjiang.

10. For instance, there is more focus on research farm trials and classroom training rather than on field demonstrations or on-farm trials. Smith (2007) highlights some of the problems confronting the extension systems in China at a local level.
11. Brown *et al.* (2008, Section 7.2) discuss the process of price formation for livestock and agricultural products in Northern and Western China including the extent and impacts of asymmetric information among traders, farmers, and herders.
12. There are numerous forms and structures of these producer groups in China. Brown *et al.* (2008, Chapter 5) provide a detailed description and critique of them in Northern and Western China. They were given further impetus with the passing of the Rural People's Specialised Cooperative Law in October 2006 although few of these cooperatives or groups conform with the international principles of cooperatives but instead involve loose connections of producers to facilitate collective efforts in breeding, extension, and marketing.

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About the authors

Colin Brown is a Senior Lecturer in Agricultural Economics within the School of Integrative Systems at The University of Queensland. He received his PhD and BAgSc from The University of Queensland. Apart from The University of Queensland, he has worked at the Danish Institute of Agricultural Economics and the Australian Bureau of Agricultural Economics. Since 1990, he has been actively involved in research on China's agricultural economy and in particular on ruminant livestock industry policy and marketing and on land resource management in China. Colin Brown is the corresponding author and can be contacted at: colin.brown@uq.edu.au

Scott Waldron is a Research Fellow in the School of Integrative Systems at The University of Queensland. He has Bachelors degrees in International Business and Asian Studies, from Griffith University, has undertaken advanced Chinese language training (Nanjing-Hopkins Centre), and is currently completing his PhD in Agricultural Economics at The University of Queensland. He worked for The Economist Group and an agricultural consulting company in Beijing before joining The University of Queensland in 1997 where he has undertaken numerous research and development projects relating mainly to ruminant livestock in Western China and associated rural development, resource management, marketing, policy, and institutional issues.

Liu Yuman is a Professor at the Rural Development Institute within the Chinese Academy of Social Sciences. He is also the Director of the Economic Research Centre of Livestock Industry within the Rural Development Institute and the President of the Chinese Economist Society of Livestock Industry. He has been carrying out research at the Rural Development Institute on the sheep and wool, beef and cattle, dairy, and pig and pork industries focusing on the socio-economic and policy issues in China since 1982. In the past, he spent six months in the Philippines, one year in Australia and another year in the USA for further education and collaborating research with his foreign counterparts.

John Longworth is an Emeritus Professor within the School of Integrative Systems at The University of Queensland. He has researched and published extensively on rural economic issues in China since 1986. His work has concentrated on ruminant livestock and their contribution to rural development, especially in the pastoral region. A former President of the International Association of Agricultural Economics, he has been a visiting fellow at Chicago and Kyoto Universities.