Sweetpotato in China

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Economic Aspects and Utilization in Pig Production

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Summary

The pattern of grain utilization in China has changed significantly in the past decades, a trend that is likely to continue in the future 1. As incomes increased, rice and wheat as staple food slowly took the place of sweetpotato, maize and other course grains, which in turn have increasingly been used as animal feed. However, despite the significant shift in the use of both maize and sweetpotato from food to feed, China's domestic feed supply is expected to lag behind the rapidly increasing demand for livestock meat products brought about by the expansion of consumption as a function of increased income. Trade liberalization and China?s membership in the World Trade Organization (WTO) are expected to exacerbate the deficit of feed grains, particularly maize. Whether China could or would be willing to import a large amount of maize is an issue of rising concern. Alternative solutions, especially substitution of other domestically produced feed such as sweetpotato are of importance, politically and economically.

Sweetpotato is the fourth major staple crop and the second largest feed grain in China. While production has remained fairly stable at 20-23 million tons/year since the 1970s, the area planted to sweetpotato has declined significantly. Yield growth of sweetpotato has generally been lower than cereals except in the recent years. Further, utilization of sweetpotato as a food staple decreased from about 50 percent of total production in the 1970s to less than 15 percent by the end of the 1990s. Feed and industrial use grew significantly over this period.

This study aims to characterize the changing pattern of China's sweetpotato production and utilization, examine the incentives governing sweetpotato production, and analyze the efficiency of substituting sweetpotato for maize as feed in pig production. In order to achieve these goals, analyses were conducted at national, regional and farm levels. About 200 households from 20 villages in five counties each of the two sweetpotato giants, Sichuan and Shandong provinces, were selected for in-depth analysis. These two provinces together account for more than one third of China?s sweetpotato production, nearly double the rest of the world?s sweetpotato output.

This study confirms the evidence of significant changes in sweetpotato utilization. The proportion of sweetpotato used as feed and for food processing both surpassed food consumption after the mid 1980s. By the late 1990s, feed use accounted for more than 40 percent and processing demand accounted for one third of total sweetpotato production. Although China is the world?s largest sweetpotato producer and is in fact a net exporter, sweetpotato has never been an important commodity in international trade. Sweetpotato was one of the first agricultural commodities liberalized in the early reform period in China, but interregional trade remains small. In many rural areas it is planted primarily as a subsistence crop intended to address household demand for feed and other uses.

Average farm size in the sampled villages was 0.38 hectare, the typical farm size in China. The average household produced 176 kilograms of sweetpotato, about 85 percent of which was used in pig production. Households raised pigs using a variety of feeds, including sweetpotato, maize, other grains, meals and forage from home-produced crops. Most of households that raised pigs were typical backyard producers. Nearly two-thirds raised less than three pigs per year. Only five households out of the 200 in our survey raised more than 10 at a time.

Household sweetpotato production was positively associated with pig production up to three heads and then declined with further increases in the number of pigs raised. The results indicate that expanding the scale of pig production with the use of backyard-grown sweetpotato as feed is not ideal because of the limited land area and the need to include other uses in land allocation. Given a declining share of backyard pig production over time and feed use as a primary reason for farmers to plant sweetpotato, the prospects for growing sweetpotato as feed is not promising, unless new sweetpotato feed processing technologies emerge.

Financial analysis based on time series data shows that although sweetpotato once was relatively more profitable than its competing crops such as maize and wheat, its relative profitability appears to have declined since the mid 1980s. This is due to unfavorable terms of trade and the slow progress in generating production technologies, the latter being closely related to public investment in sweetpotato research. Financia l profitability analysis based on our primary household survey shows that the farmers in Sichuan province had a negative profit from sweetpotato in 1997.

Although Shandong netted positive profit from sweetpotato production, incentives for substituting other crops for sweetpotato are emerging. In particular, the horticulture sector has been growing rapidly since the early 1990s, providing opportunities for farmers to reallocate land to higher valued crops. Meanwhile, regional market integration favors increased use of traded feed such as maize and compound feed in pig production. The opportunity cost of agricultural labor in many coastal counties in Shandong province is relatively high and is still growing, disfavoring low-value, labor- intensive crops like sweetpotato.

Break-even analysis demonstrates that expanding sweetpotato production will depend highly on future gains in farm productivity. Rising sweetpotato yields due to technology progress since the mid 1990s is an encouraging trend. If China wants to help farmers increase their income from sweetpotato production, increased investments in sweetpotato research and extension are essential. Labor-saving technology will also become critical in rural areas where employment in sweetpotato farms have diminished in value with the increasing opportunities for off-farm employment.

Further analysis based on a Policy Analysis Matrix (PAM) confirmed the above results and showed several other interesting findings. There was a large divergence between the social and private profitability of sweetpotato production. Sweetpotato would be more profitable if all policy interventions were removed. In Shandong, profit per hectare may increase from 790 to 1350 Yuan. Although social profit was still negative in Sichuan, the removal of all distortions would reduce the loss by 320 Yuan per hectare. Comparisons among crops showed that policies penalize sweetpotato while protecting maize production, particularly in Sichuan. Removing the policy distortions would ma ke sweetpotato even more profitable than maize in Shandong and as profitable as maize in Sichuan.

The nominal protection rate of output shows that the policies taxed production of both sweetpotato and maize, but the extent of taxation was higher for sweetpotato than maize. Policies had the effect of lowering sweetpotato domestic prices by about 15 percent, about twice as much as for maize. Careful examination reveals that the distortions mainly come from the overvaluation of the Chinese currency. Policy interventions in input markets also favored maize more than sweetpotato. For the relative comparative advantage of sweetpotato and maize production, the estimated domestic resource cost (DRC) for these two crops were very similar. The similarity of DRCs of sweetpotato and maize implies that under trade liberalization, we do not expect to see much substitution of sweetpotato for maize in animal feed, unless further technological progress is made in sweetpotato production and utilization.

Sensitivity ana lyses further validate the key role of research and technology investment in increasing the competitiveness of sweetpotato as an animal feed in China. Since it is a labor - intensive crop, labor-saving technology would increase its relatively private and social profitability while lowering the domestic resource cost. Public investment in labor-saving technology,

especially in sweetpotato production, reflects a pro-poor bias on the government?s part since sweetpotato is primarily a crop grown by marginal farms. Given that poverty alleviation is a policy objective, this provides further justification for additional public support for sweetpotato. Finally, if the exchange rate were devalued to represent the true value of domestic currency, both sweetpotato and maize would become more competitive in the domestic and world markets.

In sum, the results from this study show that both sweetpotato and maize producers are facing great challenges. Policy distortions have penalized sweetpotato and protected maize production. The social profitability of sweetpotato is at least as high as maize in both Sichuan and Shandong, if not higher. The extent to which sweetpotato can substitute for maize in pig feed will highly depend on the direction of future policies and technology developments affecting the two crops. If productivity growth in sweetpotato continues to lag behind that of maize and other feed crops, we can expect to see the use of sweetpotato for feed gradually decline, even in backyard livestock production. Therefore, increased investment in sweetpotato research and extension and removal of the current policy distortions are critical to realize sweetpotato?s full potential in China?s agricultural economy.

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