VII: Scenario 2—What Are the Benefits of Lowering the Barriers to Capital Flows?

The transition presented animal producers and meat processors with the common problem of surviving in a market economy with an outdated capital stock. Ten years into the transition, binding constraints on financial capital supplies remain a significant bottleneck. The most important sources of financial capital to livestock/poultry producers and processors in more reformed countries include foreign investors and retained earnings. The effects of lower credit costs are evaluated using the Romania model. Differential investment returns are evaluated between producer and processor levels of the marketing chain, using the Poland and Russia models.

Introduction and Background

The term "capital" is used in several ways in the economics literature. Two such uses relate to capital as a stock, and financial capital. Capital stocks describe physical and human resources that generate flows of productive services. Financial capital is a collective term, used to identify a set of funds, often obtained through such instruments as bank loans, equity sales, bond issues, etc. Financial capital is typically converted into new stocks of physical capital. Both categories of capital are relevant to a discussion of capital as a bottleneck in livestock/poultry production and processing sectors in transition economies.

The transition immediately confronted the animal production and meat-processing sectors with a common problem: how to survive in a market economy with a outdated stock of capital (both human and productive), established years previously by central planners. To address this problem, most production and processing operations initially attempted to upgrade their capital stock, whether in the form of breeding stock or new machinery. As a result, sector demand for capital of both categories—physical and financial—increased. A consequence of the sector's increased capital demand was the realization by producers and processors that the supply of financial capital was (and remains) severely constrained.

In terms of capital as a stock, animal production and meat processing industries began the transition with a stock of capital set in place by central planners. Production operations were often very large-scale, and suboptimally located with respect to feed supplies, processing facilities, and population centers. Moreover, planners' directives rather than consumers' tastes and preferences dictated the variety and quality of meat products produced under central planning.

On the processing side, characteristics of the capital stocks at the outset of transition had much in common with those on the animal production side: large-scale slaughter and processing facilities, sometimes coordinated with large-scale production complexes, but often suboptimally located with respect to transportation and population centers. Moreover, although meat processing technology tended to be current at the time of plant construction, the technology rarely received necessary maintenance or periodic upgrading. Consequently, the average stock of meat processing capital began the transition in a seriously deteriorated state.

Underdeveloped Financial Markets

By U.S. standards, financial capital markets in transition economies remain underdeveloped. Supplies of financial capital available to livestock/poultry producers and processors derive primarily from three sources: credit, retained earnings, and foreign direct investment (FDI).

Credit. Financial capital in the form of credit is provided primarily by governments and by banks. Governments in Poland and Hungary have established subsidized credit programs for livestock/poultry producers and meat processors. Applicants for subsidized credit must meet pre-determined program criteria before the subsidy is provided. In Romania, Ukraine, and Russia, governments extend open-ended credits to banks, which function as conduits to state-owned livestock/meat operations. The resulting debt is rarely serviced or repaid by either the bank or the recip-

ient agricultural operation. Indeed, it has been argued that the practice of open-ended extension of credits to agricultural banks serves only to accelerate inflation, and to perpetuate production and processing operations that would (and should) otherwise go out of business (Sedik, 1996.)

Banks are also a major source of financial capital, particularly in Poland and Hungary. The Polish and Hungarian macroeconomies have stabilized as the transition has proceeded. Real lending rates have become less volatile in Hungary and Poland and are declining to levels closer to those found in developed economies, such as Germany and the United States (IMF, International Financial Statitics). Despite relatively moderate interest rates, however, significant barriers to bank credit exist for livestock/poultry producers and processors. Important barriers include:

• low agricultural returns;

• high risk levels associated with animal agriculture;

• absence of traditions of agricultural lending by commercial banks;

• legal questions surrounding the use of agricultural land as collateral for bank loans.

Since borrowed financial capital is a "given" for the agricultural sectors in both the United States and the EU, it is reasonable to conclude that the high cost of credit in transition economies severely limits the possibilities for expansion and upgrading by livestock/poultry producers and meat processors. Limited access to credit effectively locks producers and processors into their current capital stock.

Retained Earnings and Foreign Direct Investment

The competitive nature of the market for bank loans in Poland and Hungary necessitated the development of alternate sources of financial capital by producers and processors. Two important sources of financial capital in Poland and Hungary are retained earnings and FDI. The use of retained earnings appears to be the chief means employed by small producers and processors to expand capital stocks. Clearly, reliance on retained earnings as a primary source of financial capital implies relatively slow rates of capital accumulation and growth.

FDI as a source of financial capital appears to be more prevalent among larger, well-managed production and processing operations. Northern Europe and the United States are major sources of FDI in Poland and Hungary. Aggregate FDI in both Poland and Hungary has averaged about $2 billion per year since the beginning of the transition. In the first half of 1998, 11 percent of FDI in Hungary was directed toward the food component of the economy: 1 percent to agriculture, and 10 percent to food processing (Hungarian Central Statistics Office.)

The current structure of financial capital markets in transition economies is likely an important determinant of the current structure of livestock/poultry production and processing. In its current state of development, financial capital markets are accessible to relatively large, ongoing enterprises, such as privatized processing facilities. There are currently few sources of financial capital for startup commercial livestock/poultry production or meat processing enterprises beyond retained earnings. The limited set of financial capital sources tends to "freeze" the current bimodal industry structure in place, suggesting that medium-sized commercial production and processing enterprises will remain "missing" for at least the medium term.

Implications of Developed Capital Markets and Increased Supplies of Financial Capital: Simulation Results

Implicit in the foregoing discussion is the assumption that as the transition progresses, development of factor markets will proceed, and, in particular, constraints on the availability of financial capital will become less binding on animal production/meat processing sectors. The set of models developed for Romania, Poland, and Russia allows simulation of the removal of bottlenecks that presently impede financial capital flows. These simulations provide useful insight into the likely impact of increased financial capital on the sectors.

Two sets of investment scenarios are detailed below. First, the Romanian model is used to simulate increased availability of credit that will likely follow further development of financial capital markets. This simulation tests the effects of lower credit costs. Next, given that most FDI has been channeled toward the processing end of the meat industry, the Poland and the Russia models are used to test the hypothesis that investment in processing brings higher returns than investment at the farm level.

Reduced Credit Costs in Romania

Informal interviews with Romanian livestock/poultry producers suggest that credit costs are a major impediment to agricultural investment. Accordingly, the simulation below shows possible Romanian livestock/poultry producer and meat processor responses to lower credit costs. The reduction of credit costs is simulated by a 20 percent reduction in the price of the nontraded input. In this scenario it is assumed that all producers, not only agricultural producers, benefit from the lower credit costs.

Credit cost reductions targeted at the entire productive sector of the Romanian economy generated the results summarized in table VII-1. The simulation results indicate that commercial producers and processors benefit from lower credit costs to a greater degree than subsistence operations. The reason is that commercial operations make greater use of lower-cost credit services and purchased inputs.

The increased output by commercial producers puts upward pressure on land rents and the prices of nontraded feeds. For commercial operations, the benefits from lower credit costs more than compensate for the price rises of other inputs. In contrast, subsistence operations tend to use fewer of the services whose prices have declined. Small subsistence operations are therefore more vulnerable to higher land rents and feed costs. Yields in the subsistence sector are often lower than commercial sector yields, and the result is that land accounts for a higher share of subsistence sector costs. Moreover, reduced credit costs induce large production increases by commercial

hog operators, forcing domestic hog prices down. Lower prices mean lower returns and production for subsistence producers.

The shift between the commercial and subsistence sectors is reversed in the case of poultry. Both subsistence and commercial poultry producers benefit from reduced credit costs more than any other sector, but subsistence producers expand output more than commercial ones. Total births rise 7 percent, with a 9-percent rise in the subsistence sector and just a 6-percent rise in the commercial sector. The reason is that subsistence poultry producers are much heavier users of nontraded goods than subsistence swine or cattle producers because they buy chicks from state poultry enterprises. The cost share of nontraded goods for subsistence poultry growers is nearly 12 percent, while it is near zero for subsistence swine and cattle.

The crop sector is affected by the rise in land rents, but this has a greater negative impact on subsistence producers since land comprises a higher share of their production costs (table VII-2.) For commercial crop producers, the rise in land rents is offset by the reduction in credit costs, and commercial output of grain and oilseeds rises. Area planted by commercial farms declines slightly, but yields rise, resulting in an 8-percent increase in grain output and a 1-percent rise in oilseed output. In contrast, grain output by subsistence producers falls 4 percent, and oilseed output falls by 3 percent. On net, grain output rises nearly 5 percent.

While grain output rises, consumption remains constant. The decline in the cost of credit leads livestock producers

Table VII-1—Romania: Reduction in cost of bank credit, all producers

	Cattle production	Beef processing	Hog production	Pork processing	Broiler production	Broiler processing	Farm milk production	Butter production	Cheese production
				percent changes from '94-'96 base					
Consumer price	1	0[1]	-2	0[1]	-1	0[1]	-1	-1	-1
Producer price	1	0[1]	-2	0[1]	-1	0[1]	-1	-1	-1
Returns to capital: subsistence	2	-3	-20	9	60	-23	-3	-2	1
Returns to capital: commercial	15	5	16	22	12	169	34	25	9
Births[2]/output: subsistence	0	-1	-9	2	16	4	-1	0	0
Births[2]/output: commercial	0	1	47	4	7	9	19	6	2
Exports	n.a.[3]	-23	n.a.[3]	9	n.a.[3]	-7	n.a.[3]	n.a.[3]	34

[1]Price change equals zero, because good is traded
[2]Births are applicable to production; output is applicable to processing
[3]Not applicable: cattle, hogs, birds, milk, and butter assumed to be nontraded goods

Table VII-2—Romania: Effect of reduction of credit costs on crop output and utilization

	Sugarbeets	Potatoes	Grain	Oilseeds	Silage
	percent change from '94-'96 base				
Consumer price	3	-3	0[1]	0[1]	1
Producer price	3	-3	0[1]	0[1]	1
Rent-Land	9	9	9	9	9
Area	4	-2	2	-1	-2
Commercial	22	-1	6	-1	-2
Subsistence	0	-4	-5	-4	-2
Output	7	-1	5	0	0
Commercial	25	0	8	1	-1
Subsistence	2	-2	-5	-3	-1
Food	n.a.[2]	2	0	0	n.a.[2]
Feed	-3	-3	0	0	0
Process	11	n.a.[2]	n.a.[2]	n.a.[3]	n.a.[2]
Exports	n.a.[4]	n.a.[4]	79	n.a.[4]	n.a.[4]

[1]Price change equals zero, because good is traded
[2]Not applicable because the good is not used in this way
[3]Not applicable because the model does not calculate this value
[4]Not applicable because the good is nontraded

to substitute other inputs for feed, and the income effect of the shock is not sufficient to affect food demand. The result is that grain exports nearly double.

Are Investment Returns Higher at the Production Level or at the Processing Level of the Marketing Chain?

The credit cost reduction scenario in the Romania model projects ahead to a time when livestock/poultry producers and meat processors will have comparatively easier access to credit. A relevant area of current inquiry is identification of the level in the marketing chain where investment will generate the largest capital returns. The scenarios set out below focus on identification of location(s) in the marketing chain for capital investment. Whether to augment capital stocks at the farm level, the processing stage, or at the point of retail sale is a relevant issue presently, and will likely continue in importance as the transition concludes.

Most foreign direct investment in transition livestock and poultry sectors has been targeted at the processing end of the marketing chain. Such investment patterns raise several issues:

- Are there differential returns between investment in animal products processing and livestock/poultry production?

- What are the differential effects of targeted subsector investment; that is, what happens when investment is targeted at the commercial sector alone, as private

investment tends to be, or, when investment is targeted at the peasant sector alone, as is the practice of international lending institutions?

A set of investment location scenarios is set out below, for the hog/pork sector in Poland, and for the poultry sector in Russia.

Investment in hog production and pork processing in Poland. Using the Poland model to simulate six investment scenarios shows that the same investment quantity can have different effects, depending on (1) the level of the marketing chain where the investment injection occurs, and, (2) assumptions regarding the tradability of the processed good (which in this case, is pork). In the first set of three scenarios, we invoke the "small country"[7] assumption for Poland, and assume that pork is a traded good, while live hogs are assumed to be nontraded. Investment shocks of ten percent are imposed on the model in three ways. In the first scenario (Scenario 1), the investment occurs at the producer level. In the second (Scenario 2), the investment is imposed at the processor level, and in the third (Scenario 3), investment occurs simultaneously at the producer and the processor level.

In the second set of three scenarios, the same investment shocks are imposed as in the first scenario set, but pork is

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[7]The small country assumption focuses on the potential of a country's trade patterns to affect international market prices. Because Poland's livestock/poultry production and processing sector accounts for a relatively small percentage of world animal products volume, it is assumed that Poland's production, processing, and trade decisions have no effect on international market prices.

assumed to be a nontraded good. When pork is nontraded, domestic market prices adjust to balance domestic demand and supply. Net trade remains constant.

The results of Scenario 1 (table VII-3) show the effects of a ten percent increase in the capital stock of Polish hog producers. As a result of the capital stock increase, the rate of return on hog production-specific capital is 29 percent lower than in the base period solution. That is, with a greater supply of capital, the per unit return is lower. With an enhanced capital base however, more hogs can be produced profitably at the given market price. The model results show a 4-percent increase in hog production, which causes a 3-percent reduction the equilibrium market price for hogs, as prices must adjust to clear the internal market. Lower hog prices increase the quantity of slaughter hogs demanded by processors by 5 percent. Ending inventories decline by less than one percent, as a result of lower returns to capital in the form of breeding stock.

Processors benefit from the enhanced capital base of the hog production sector, and pork production increases by 5 percent. Because pork is a traded good by assumption, the Polish price remains the same and the world pork price does not change. The result is a 174-percent increase in Polish exports.

In Scenario 2, where the 10-percent capital stock increase occurred at the at the processing level of the marketing chain, both the processing sector as well as the hog pro-

duction sector appear to benefit from the investment, to a greater extent than under Scenario 1. Hog producers are unambiguously better off when investment takes place at the processing level due to the expansion in derived demand: capital returns increase by 15 percent, and ending stocks increase slightly, reflecting gilt retention for augmentation of the breeding herd. Increased demand for hogs from the capital-enhanced processing sector increases the equilibrium hog price by 2 percent; in response, the pig crop increases by 7 percent. On the processing side, slaughter increases by 8 percent. As pork is a traded good, the domestic Polish market price remains constant, and the increase in output is exported. Exports increase by more than 350 percent.

Investment at the processing sector thus results in larger gains/smaller declines in both the processing and the production sector, in comparison to the results that were observed when investment occurred at the production level of the marketing chain (Scenario 1). Processing sector investment generates larger gains or smaller declines in capital returns for both processors and hog producers and larger increases in pig crops, slaughter, pork output, and exports. Moreover, when investment occurs at the processing level, hog prices increase, as opposed to the decrease that was observed under the production sector investment scenario.

In Scenario 3, where investment occurs at both the production and processing levels of the marketing chain,

Table VII-3—Poland hog/pork sector investment scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Increase in capital stock (percent)	10	10	10	10	10	10
Level of investment	Production	Processing	Production and processing	Production	Processing	Production and processing
Hogs traded	No	No	No	No	No	No
Pork traded	Yes	Yes	Yes	No	No	No
			percent changes from '94-'96 base			
Processing sector						
Price	0[1]	0[1]	0[1]	-2	-5	-7
Capital returns	12	-6	6	1	-30	-29
Slaughter	4	8	12	2	1	3
Output	5	8	12	1	2	4
Exports	174	356	529	n.a.[2]	n.a.[2]	n.a.[2]
Production sector						
Price	-3	2	-2	-4	0	-4
Capital returns	-29	15	-14	-35	2	-33
Pig crop	4	7	11	1	1	2
Ending inventory	-1	0	0	0	0	0

[1]Price change equals zero, because good is traded
[2]Not applicable because good is nontraded.

model results are similar to Scenario 1, where the processing sector appears to benefit unambiguously, while hog producer effects are mixed. Investment in the production sector drives the results in this scenario. The investment-enhanced production base allows more hogs to be produced at a given output price, leading to an 11-percent increase in the pig crop, a greater increase than observed in either Scenario 1 or 2 since the inflow of investment is greater. The large increase in the pig crop forces hog prices lower and increases the quantity of hogs demanded by the processing sector for slaughter. In the processing sector, slaughter, output, and exports all increase by larger percentages than those observed under Scenarios 1 and 2. Returns to capital fall in the production sector, but by less than what resulted from investment in the production sector alone (Scenario 1). Despite an enhanced capital base, returns in the processing sector rise, unlike the decline in returns that resulted from investment in the processing sector alone (Scenario 2).

In the second set of three scenarios, the final good—pork—is assumed to be nontraded. That is, the domestic price of Polish pork adjusts to equalize the supply and demand for pork, independent of international markets. Pork nontradability could result from a sudden outbreak of animal disease, for example, or allegations of unsafe processing practices. Table VII-3 summarizes the results of the second set of three investment scenarios: first, investment in the production sector (Scenario 4); second, investment in the processing sector (Scenario 5), and last, investment in both sectors simultaneously (Scenario 6), all under the assumption of final good nontradability.

The changes demonstrate, by counterexample, the beneficial effects of linkage to the world market. When pork is a nontraded good, positive responses to investment are lower in magnitude, compared with responses generated by models that assume that Polish pork is traded. This occurs because as the investment expands pork output, the price of pork falls to clear the market.

The nontradability assumption also appears to amplify declines in capital returns responses and to diminish positive effects when compared with results generated by models incorporating pork as a traded good. Under Scenarios 2 and 3, changes in capital returns on the processing side are 4 to 5 times greater under the nontraded assumption. On the production side, capital returns changes are more negative in Scenarios 4 and 6, and less positive in Scenario 5, relative to identical investment scenarios where pork is a traded good.

This version of the model has important implications for all the transition countries. Even though the model assumes that meat products—beef, pork and poultry—are fully tradable, the reality is that with the possible exception of Hungary, meat is not fully tradable in any of the countries considered in this study. Even in Poland, export markets are limited by uneven quality and disease problems. For example, because Poland vaccinates for foot-and-mouth disease, export markets for fresh pork are severely restricted. Tradability is further hindered by the various bottlenecks we have identified. Because of these bottlenecks, world prices are not fully transmitted to producers. The results of this scenario suggest that all these countries will become much more attractive to investors once integration with world markets is complete.

Investment in poultry production and poultry processing in Russia. As the transition has unfolded in Russia, imported poultry meat has become a major source of protein for Russian consumers, particularly between 1993 and August 1998. The volume of poultry meat imports and the relative ease of transferring poultry production and processing technology across international borders suggest a high potential for investment in the domestic poultry sector. The scenarios detailed below consider three types of investment in the poultry and poultry meat industries. Scenario 1 assumes a 10-percent increase in the capital stock of the poultry processing industry. In Scenario 2 investment increases the capital stock of state poultry production enterprises (farms) by 10 percent. In Scenario 3, there is a 10-percent increase in the capital stock of subsistence poultry production enterprises. Results are summarized in table VII-4.

Investment in commercial poultry meat processing. In Scenario 1, poultry meat prices are assumed to be linked to the world market. That is, poultry meat is a traded good, whose domestic price equals the world price. Because the domestic poultry meat price remains constant, domestic consumption does not change, and the production effects of added investment appear on the trade side.

The result is a 4-percent increase in poultry meat production and a 5-percent decline in imports. Lower processing costs lead to an increase in derived demand for slaughter poultry and a small increase in the farm price of birds. Higher profits stimulate an expansion in poultry production to meet increased processor demand. Total poultry numbers rise 3 percent, and more birds are held as ending inventory, as long-run profitability of bird production increases.

The expansion of poultry inventories triggers a 3-percent increase in feed demand for grain and oilseed meal. Some of the increased grain use by poultry diverts feed from other animals, causing cattle and swine numbers to fall slightly. Most of the additional grain demand is met by increased imports, which rise 3 percent. The increased demand for oilseed meal is met through a 3-percent decline in oilseed and meal exports, in meal equivalent.

Investment in commercial poultry production enterprises. An alternative to targeting investment at the processing level of the poultry marketing chain is to invest in farm level poultry production. Such investment can take place at either commercial enterprises or subsistence farms. The results which follow consider a 10 percent increase in the capital stock of commercial poultry production facilities (Scenario 2).

The increased capital in commercial bird production generates a 2-percent increase in poultry meat output, while poultry meat imports fall 2 percent. On a per dollar of investment basis, the poultry meat output increase is more costly to obtain if the investment occurs at the farm level. A $1 million investment in the commercial poultry processing industry results in 9,000 tons of added poultry meat output. Each $1 million invested in commercial poultry production generates 6,000 tons of additional poultry meat.

Investment at the farm level leads to an increase in poultry meat output because increased poultry numbers drive down the cost of birds to processors. However, compared
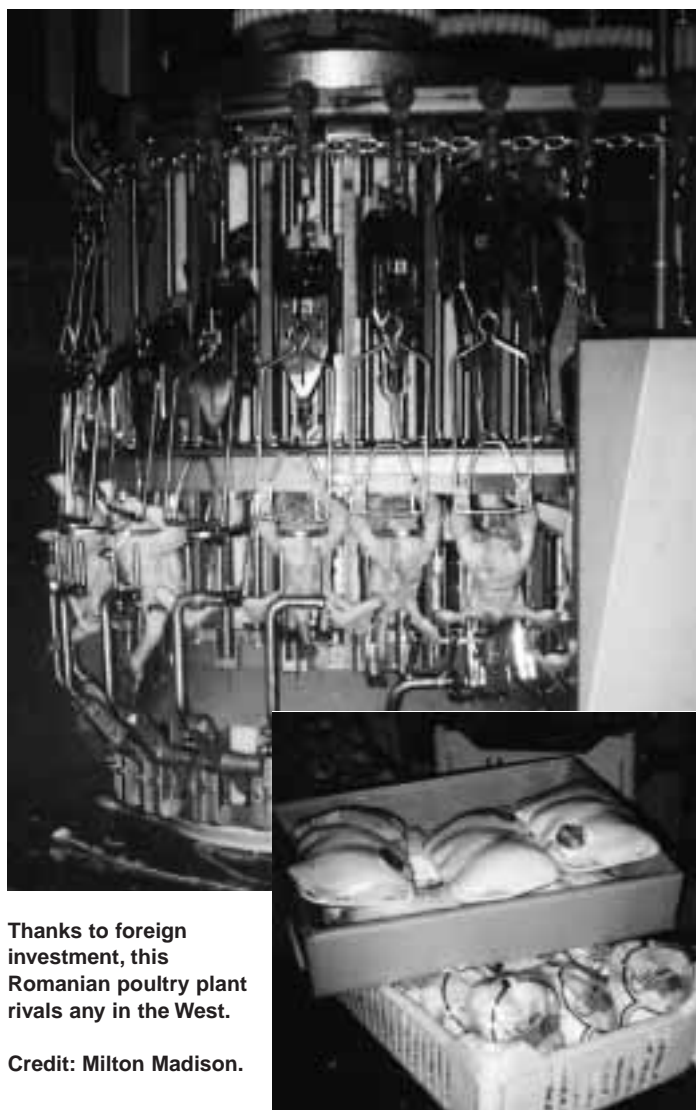
Thanks to foreign investment, this Romanian poultry plant rivals any in the West.

Credit: Milton Madison.

Table VII-4—Russia: Investment in poultry sector: 10-percent increase in capital stock

	Scenario 1	Scenario 2	Scenario 3
Level of investment	Processing	Production	Production
Sector	Commercial	Commercial	Subsistence
	percent changes from '94-'96 base		
Poultry meat			
Price	0[1]	0[1]	0[1]
Production			
Commercial	8	3	2
Subsistence	-1	2	1
Total	5	2	1
Exports	5	-2	-1
Poultry			
Price	1	-1	0
Output			
Commercial	7	5	-6
Subsistence	1	-1	15
Total	5	3	2
Slaughter	5	3	1

[1]Price change equals zero, because good is traded

with Scenario 1, in which investment occurs at the processing level of the marketing chain, investment at the farm level yields a smaller expansion of bird numbers and a lower price to bird producers. Each $1 million invested at the processing level expands bird numbers by almost 7 million birds, compared with 4 million birds when the same investment is made in the commercial poultry production facilities.

As in the Scenario 1, investment in commercial bird enterprises increases feed demand for oilseed meal and grain. A 1-percent reduction in oilseed and meal exports (in meal equivalents) satisfies the added derived demand for meal. The increased feed demand for grain appears as a 1-percent increase in grain imports.

Investment in subsistence poultry production farms. Investment in subsistence bird farms (Scenario 3) yields responses that are similar to those described for the commercial investment scenario, but the magnitudes of the changes are smaller. Poultry meat output rises just 1 percent under this scenario, and imports fall by 1 percent. The 2-percent increase in poultry numbers lowers the processor price of birds by less than 1 percent.

Scenario results show that investment in commercial poultry production facilities yield larger increases than investment in the subsistence farms. Each $1 million invested in commercial bird production facilities generates an

additional 6,000 tons of poultry meat, and 4 million additional birds, than the same investment in subsistence facilities. The same investment in subsistence poultry production farms yields 600 tons of poultry meat and 434,000 birds.

Key Implications From the Investment Scenarios

• Lower credit costs will not immediately benefit all producers and all processors. Rather, those operations that have utilized credit in the past will likely benefit first. Smaller operations will initially face a learning curve, with its associated transaction costs.

• Investment targeted at the processing level brings greater benefits to both processors and producers than when investment is targeted at the producer level.

• Tradability of the final good (pork in the examples above) enhances capital returns to both processors and producers. Returns are lower when trade in the final goods is prevented.

• Investment in commercial poultry production and processing enterprises in Russia appear to generate greater capital returns and larger output changes than comparable investment in subsistence enterprises.