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Livestock sector development, economic growth, and poverty reduction[1]

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The global distribution of poor livestock keepers tailors closely the regional distribution of poverty densities in the developing world. Reducing poverty among this group requires livestock sector growth in these regions.As per capita incomes expand, household expenditures on meat and milk grow faster than those on grains and cereals. Strong growth in demand for meat and milk presents a significant catalyst for expansion of the economic activity and incomes of rural smallholder livestock keepers. More recent data show that the larger majority of rural households even in low-income developing countries are market-oriented rather than pure subsistence producers. Public investments that efficiently link livestock products to centers of domestic demand will allow rural livestock producers to capture the societal value accorded to their higher-value meat and milk products.The subsequent growth of livestock-related rural industries along the market chain offers an additional growth and poverty-reducing channel via spillover impacts.

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1. Introduction

Between 2000 and 2030, the demand for animal source foods (ASF) in developing countries is projected to continue its strong expansion from the previous decade due to growing populations and rising per capita incomes. For developing country regions in the aggregate, demand is seen to double; particularly in low-income countries (LICs), the increase is projected to be more than 150 percent [Robinson and Pozzi, forthcoming]. As of 2007, most of the developing country regions continue to be net importers of milk and meat products [FAOSTAT 2010]. It is argued that meeting a great part of this growing demand by developing countries through growth in their livestock sector could serve as a vehicle for broad-based economic growth and development. This paper traces the literature on the nature of pro-poor growth, and attempts to present how growth in the agriculture sector in general, and in the livestock sector in particular, can be a catalyst for pro-poor growth in developing countries, most especially in low-income countries.

2. Economic growth and poverty reduction

Most economists and policy makers would agree that economic growth is essential for poverty reduction (Dollar and Kraay [2002]; Valdés and Foster [2005]; Diaz-Bonilla [2007]). Evidence strongly indicates that sustained growth continues to be a necessary condition for reducing poverty [Valdés and Foster 2007]. Economists also contend that high economic growth alone is not sufficient to effect a rapid reduction in poverty (Lopéz [2006]; Balisacan [2007]; Ravallion [2007]). For example, Ravallion [2007] carried out further investigations on the relationship among economic growth, changes in inequality, and poverty reduction, spanning a period from about 1980 to the early 2000s. In general, across countries, it appeared that growth, on average, tended to be roughly distribution-neutral. The author, however, cautions against making hasty policy implications on the finding, which merely revealed that, on average, in the process of growth over the period, there was very little effective redistribution, in favor of either the poor or the nonpoor. This does not imply that to reduce poverty, distribution outcomes are unimportant for the poor, and that policy makers in developing countries should focus on economic growth alone. In general, therefore, while growth, on average, leads to poverty reduction, economic growth can be a blunt instrument in fighting poverty in countries with extreme inequality, unless that growth is coupled with improvements in income distribution. The

acceleration of poverty reduction will require a more pro-poor pattern of growth and inroads into reducing the inequalities that constrain the poorer segments of the population to exploit the economic opportunities that are unleashed by growth.

3. Agriculture, rural development, and pro-poor growth

There are quite a lot of discussions on what constitutes *pro-poor growth*. For some, growth is already pro-poor if it leads to any poverty reduction. For others, growth is pro-poor only if it also leads to declining inequality. Klasen [2007] goes beyond the theoretical conceptualizations and argues that from a policy perspective, it is useful to define pro-poor growth as growth that maximizes the income gains for the poor and thus accelerates progress toward meeting Millennium Development Goal 1 (MDG1). It requires a growth that occurs in regions where the poor live, in the economic activities where the poor are engaged in, that uses more intensively the factor of production that the poor possess. In most developing countries, these will call for growth that involves the agriculture sector, reaches the rural areas, and is labor intensive.

Among countries in the developing world, however, there are differences in the relative importance of the agriculture sector to the economy. The 2008 World Bank Development Report classifies developing countries into being agriculture-based, transforming, or urbanized [World Bank 2007]. This categorization is reproduced in Table 1, and selected socio-demographic characteristics under these categories are presented.

The facts are quite clear, particularly for agriculture-based and transforming economies: majority of the population are still in the rural areas, and that the rural poor constitute 70-80 percent of the poor. In these two categories of developing countries, agriculture employs a large majority of the labor force.

Focusing solely on the share of agriculture value-added in the national gross domestic product (GDP) masks the significance of the potential contribution of agriculture-led growth in poverty reduction. While the share of agriculture in GDP tends to decline as economic development proceeds, this does not imply that stimulating growth in the industrial and services sectors of the economy at the expense of agriculture will achieve faster economic growth and poverty reduction. As Valdés and Foster [2005] contend, agriculture can promote growth directly through its own expansion, and indirectly through its spillover impacts on the rest of the

Table 1. Selected socio-demographic characteristics of three categories of developing countries

	Agriculture-based countries	Trans-forming countries	Urbanized countries
Share of agriculture value-added in GDP (%)	29	13	6
Share of rural population (%)	68	63	26
Share of agricultural workers in the labor force (%)	65	57	18
Total poverty rate (%)	49	22	8
Rural poverty rate (%)	51	28	13
Urban poverty rate (%)	45	11	6
Share of rural poor in total poor (%)	70	80	46
Total population (million)	615	3510	965

Source: World Bank [2007].

economy, and that in contrast to non-agricultural growth, it can differentially contribute to the increase in the income of the poorest in a manner that exceeds its relative size in the economy's GDP. Several country studies in Asia and Africa have shown that GDP growth generated by growth in agriculture has stronger poverty reduction impacts than the same magnitude of growth in the non-agriculture sector, particularly in lower-income countries that are at the beginning of the process of growth and development (Ligon and Sadoulet [2007] cited in World Bank [2007]).

Haggblade, Hazell, and Reardon [2005] have generated estimates of the direct and indirect effects of agriculture growth on other sectors of the economy as well as on the economy as a whole for Asia, Africa, and Latin America, and assigned the source of these impacts to consumption and production linkages, respectively (Table 2).

In Table 2, the agriculture growth linkages are relatively strong in Asia and Africa as compared to Latin America, reflecting the fact that most Latin American countries are highly urbanized, with the agriculture sector GDP contributing a relatively small part in the total economy, and that high inequalities exist in the agriculture sector. The significance of growth linkages with the rest of the economy is manifested in the relatively larger rural nonfarm impacts, indicating that rural services as well as other nonfarm enterprises respond positively to the initial increase in agricultural

Table 2. Agricultural growth linkages in Asia, Africa, and Latin America

Region	Initial agricultural income increment	Magnitude of additional income growth			Relative share of source of linkages (%)	
		Total	Rural nonfarm	Other agriculture	Consumption (horizontal)	Production (vertical)
Asia	1.00	0.64	0.58	0.06	81	19
Africa	1.00	0.47	0.30	0.17	87	13
Lat. America	1.00	0.26	0.21	0.05	42	58

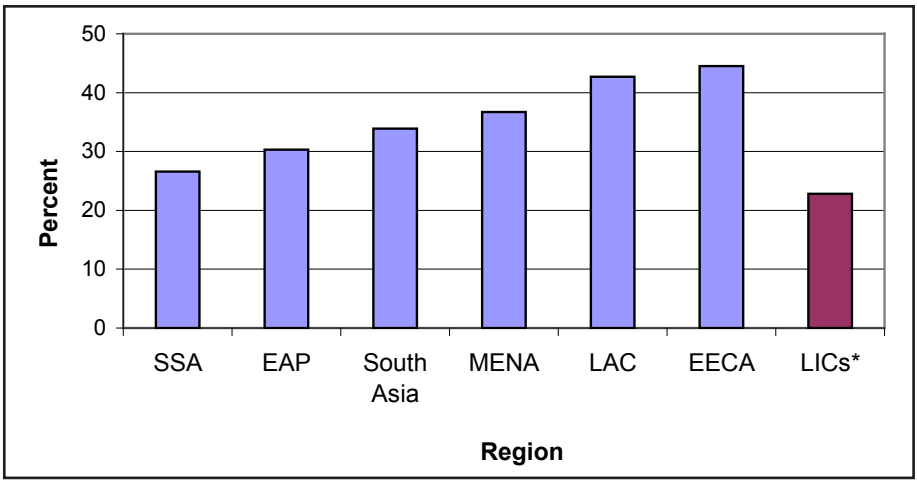
Source: Haggblade et al. [2005].

incomes. In both Asia and Africa, the consumption expenditure linkages overwhelmingly dominate.

4. The role of livestock in generating agricultural and overall economic growth

The contribution of growth in the livestock sector to poverty reduction flows from its role in generating growth in agriculture and in the economy as a whole. Factors that influence the size of this contribution include the following: the size of the livestock sector relative to agriculture and to the overall economy; the linkage between the livestock sector and the rest of the economy in terms of input-output relations; the intensity of use of the factor that the poor households are dominantly endowed with in the livestock and the stimulated sectors; and the consumption patterns on meat, other food, and nonfood goods by the poor and nonpoor households.

Across developing country regions of the world, the size of the livestock sector in relation to agriculture varies. On average, as of 2007, the share of the livestock sector in agriculture GDP was about 35 percent. This ranged from as low as 27 percent in Sub-Saharan Africa (SSA) to as high as 43-45 percent in middle-income developing regions such as Latin America and the Caribbean (LAC) and Eastern Europe and Central Asia (EECA). Among low-income countries, the contribution is still very low at 23 percent. While the stylized pattern is that the share of agriculture GDP in the overall economy tends to decline as developing countries move from lower-income to middle-income levels, the share of the livestock sector in agriculture GDP tends to rather increase. This pattern is fairly consistent with the transformation



* Based on WB classification.
Source: FAOSTAT [2010].

Figure 1. Share of livestock sector in agriculture GDP in developing country regions, 2007

within the agriculture sector where as countries move up the growth and development ladder, the high-value sectors (such as livestock, dairy, and fruit and vegetable sectors) expand and the formerly dominant staple sector recedes. Focusing on LICs such as those in SSA, where poverty incidence is prevalent, the importance of the livestock sector as a venue for poverty reduction lies in the sector's potential as a rapid growth sector in agriculture and the rural economy.

The link between the livestock sector and the other sectors lies in the extent of the market relations between livestock-producing households and the rest of the economy. Although poor agricultural households are thought to be subsistence oriented, their market involvement is more extensive than commonly perceived. The Food and Agriculture Organization (FAO) Rural Income Generating Activities (RIGA) data set involving 12 sample countries in Africa, Asia, and Latin America shows that purely subsistence households were rare, and that the vast majority of rural households are partly engaged in market activities, even if they aim also to produce food for home consumption. Farm households in majority of the countries sold between 30 percent and 68 percent of their livestock to the market, and that the poorest households (bottom quintile) were as likely as their wealthier counterparts to sell about the same proportion of livestock produce to the market.

Table 3 shows the extent of market engagement of rural households in the 12 sample countries of the RIGA data set, focusing on the bottom income quintile. Except for Pakistan, a great majority of the rural households engaged in market exchange in agricultural products. While the proportion of livestock sold varies, for more than half of the sample where information is known, households sold more than a third of livestock produced. In most of the countries, the contribution of livestock to household income exceeded 20 percent. Market exchange at this level consists of the primary link between rural livestock producers and the local economy, as suppliers of the primary product to the first-level exchange point in the whole supply chain, from rural areas to consumers in urban centers.

Table 3. Extent of market engagement of the bottom income quintile of rural households and the contribution of livestock to incomes

Country	Proportion of HH selling agricultural products (%)	Proportion of livestock production sold (%)	Contribution of livestock to total HH income (%)
Ghana	81	56	25
Madagascar	96	65	25
Malawi	64	13	20
Nigeria	74	n/a	12
Pakistan	46	n/a	32
Nepal	59	48	23
Viet Nam	93	70	22
Bangladesh	65	29	4
Ecuador	62	34	21
Nicaragua	80	39	16
Guatemala	59	23	6
Panama	58	19	3
Source: RIGA dataset			

Livestock production systems vary in input intensities. Globally, the highest densities of poor livestock keepers are found in the mixed crop-livestock systems in South Asia and Sub-Saharan Africa [Otte et al., in press]. In general, these are mostly integrated systems where mainly crop by-products and residues are utilized to feed livestock, and where livestock

is used either as draught power in farm operations, or livestock manure is used as fertilizer to crops, or both. Among rural households raising livestock, the process of transforming crop by-products and residues to usable animal feed, and the process by which farm animals are used as draught power in farming operations, are undertaken mainly by the household members using manual labor. When the farm is not self-sufficient in inputs, rearing stocks and fodder are purchased from neighboring households who have excess of them. These inputs are also produced under labor-intensive production systems. In these systems, the value-added component of the value of marketed output is relatively high.

In contrast, in intensive landless livestock production systems undertaken by commercial farms and semicommercial households in peri-urban areas, the main intermediate inputs to livestock production—that is, the growing stock, the feed, and other additives—are supplied by commercial farms and formula feed suppliers. Under this system, there is relatively less value addition at the level of the farm household.

Household consumption expenditure patterns in developing countries play a large role in determining the size of consumption linkages from growth generated in the livestock sector. In the lower-income regions of SSA, SA, and EAP, more than half (53-61 percent) of total expenditures is devoted to food, with the rest going to nonfood items. In contrast, only about 13 percent of expenditures in high-income countries is allocated to food. Within the food group, about 30 percent is spent on staples (bread and cereals). Income elasticities of demand for food, however, are low (typically less than unity), while income elasticities of demand for nonfood items are relatively high (greater than unity).

Table 4 shows the predicted expenditure allocation of additional income, calculated across developed world regions. For each additional dollar of expenditure, less than half would be devoted to food items, with nonfood items getting the greater share of added income. Within the food group, the share of cereals and bread falls to about 25 percent, on average, among developing country regions. The additional dollar of expenditure on meat and dairy products already almost matches that on bread and cereals. Among the middle-income regions of EECA, LAC, and MENA, the proportion of additional expenditure on meat and dairy products is even higher at 33-38 percent of food expenditures.

The expenditure patterns in developing countries suggest that a large proportion of additional incomes generated from growth in the rural

Table 4. Predicted expenditure allocation (%) of additional income, by world region

REGION	Percent allocated to food	Percent of food expenditure allocation				
		Bread & cereals	Meat & dairy	Fish	Fruits & vegetables	Other food items
EAP	40.0	26.2	20.4	7.6	20.4	25.3
China	43.5	27.7	20.3	6.3	21.6	24.1
EECA	24.3	13.3	34.3	2.6	16.4	33.4
LAC	16.0	12.1	37.9	3.4	13.7	32.9
MENA	27.2	14.9	33.0	4.3	14.5	33.4
South Asia	39.5	27.1	23.5	6.1	17.5	25.7
India	40.9	26.8	23.8	5.9	18.7	24.9
SSA	47.4	24.9	19.7	13.2	16.2	26.0
All regions	36.1	24.6	23.5	7.0	18.2	26.7
LICs*	36.8	29.7	18.0	9.4	12.4	30.4
High-income countries*	3.8	6.7	29.0	7.5	11.3	45.5

* Based on 2010 World Bank classification.
Source: Authors' calculations based on the International Comparison Program (ICP) 2005 data set.

livestock sector will continue to be spent on food products, among which livestock and dairy products will increasingly become more and more important in the household food budget relative to staples. As higher levels of income are attained, however, the nonfood component will obtain greater prominence. The increasing importance of livestock and dairy products within the food basket is a strong source of the consumption linkages that reinforce the growth in demand for these products as a result of the first round of income growth among rural households.

The growth in demand for nonfood products in the generation of income multipliers should not be overlooked. Where the supply response to the increase in demand for these goods and services takes place in the local or domestic economy, the income multipliers will likewise be unleashed. Table 5 presents estimates of household multipliers for livestock production and livestock product processing, respectively, across major world regions derived from the GTAP database and weighted by country populations.

In general, the household income multipliers of both livestock production and livestock product processing are higher in developing countries as a whole than in the group of high-income countries. Overall, the magnitude of the multipliers of livestock production and livestock product processing do not deviate far from each other. Within regions and within countries, however, the differences can be large, with the multipliers of livestock product processing being markedly higher than those of livestock production in the Middle East and North Africa and in Sub-Saharan Africa. Comparing across regions, the livestock production and the processing multipliers are largest in South Asia and sub-Saharan Africa, indicating a large potential of livestock sector development to directly and indirectly boost household incomes. Even in the other regions that tend to have higher levels of per capita income and lower poverty rates, the livestock sector multipliers are substantial.

Within an intersectoral framework, the sizes of the household livestock sector multipliers presented in Table 5 are not relevant unless they are compared with the multipliers of other sectors of the economy. Table 6 presents the ratio of the household multiplier of livestock production to the respective values of some comparison (sub)sectors such as crops or fruits and vegetables, and manufacturing and services across major world regions and economic groupings (country values are again weighted by

Table 5. Household multipliers* for livestock production and processing by major world region

Region	Primary livestock products	Processed livestock products
EAP	2.7	2.4
China	2.5	2.2
EECA	2.8	2.7
LAC	3.2	3.1
MENA	3.5	5.4
South Asia	4.6	4.0
India	4.6	4.2
SSA	4.3	6.1
All-regions	3.5	3.6
High-income countries	2.9	2.7

* Incremental effect of one-dollar additional spending on aggregate national household incomes.
Source: Derived from the Global Trade Analysis Project (GTAP) database (accessed 2010).

population). A ratio greater than unity indicates that the livestock sector multiplier is larger than that of the comparison sector; a ratio less than unity implies otherwise. The computed estimates for the ratios under Fruits and Vegetables for two regions have been adjusted to exclude two countries that are obvious outliers, Malaysia in East Asia and the Pacific, and Nigeria in Sub-Saharan Africa. Their inclusion significantly inflates the weighted regional values, as well as the overall Developing Countries value.

Table 6 reveals that across all developing country regions and for all comparisons, the ratio is always above unity. Across all developing country regions, the income multiplier of livestock production is around double that of crops, although less than double that of fruits and vegetables. Compared with manufacturing, livestock sector growth has almost four times the multiplier effect while compared with services, the advantage of livestock is the least. Within regions, there is substantial variation in the extent to which the income multiplier impacts of the livestock sector exceed those of the comparison sectors, indicating variation in the degree to which these sectors themselves are integrated with the rest of the national economy.

Table 6. Ratio of household multipliers of livestock production to multipliers of other sectors by major world region

Region	Crops	Fruits & vegetables	Manufacturing	Services
EAP*	1.8	2.1	1.9	1.4
China	1.8	1.6	2.0	1.3
EECA	3.3	1.9	4.0	1.0
LAC	1.8	1.1	2.5	1.3
MENA	2.6	1.1	3.3	1.1
South Asia	1.3	1.2	2.6	1.3
India	1.1	1.3	2.1	1.6
SSA**	3.4	2.9	18.0	1.9
All Regions	1.9	1.6	3.8	1.3
High-income countries	1.5	1.0	1.8	0.9

Source: Derived from GTAP database (accessed 2010).
* Malaysia: F&V multiplier = 0.005; LS/F&V ratio = 211.9.
** Nigeria: F&V multiplier = 0.09; LS/F&V ratio = 34.4.

In general, under all sector comparisons, the ratios are markedly larger in developing countries as a whole than in the high-income country group.

This implies that in high-income countries, the input-output structure of the livestock production and processing subsector is very much different from those of developing economies. Given that the livestock and processing subsector in high-income countries is highly formal and highly industrialized, with inputs and outputs fully traded, the multiplier impacts are not expected to deviate very much from the other economic activities.

Along the livestock value chain, the distribution of income gains could vary across participants. Building on analysis of detailed data from Senegal, Roland-Holst and Otte [2006] conclude that although lower-income rural households receive smaller absolute gains from the livestock value chain than higher-income groups, the relative benefits to them are greater. This further strengthens the case for livestock as a pro-poor policy instrument, as the marginal effect of improving livestock supply conditions will disproportionately benefit the country's rural poor majority. Multiplier decomposition analysis revealed that the small absolute livestock-livelihood gain for the poorest comes almost entirely from direct production income. Both rural quintiles 1 and 2 get more than three-quarters of their livestock-related income directly from animal (product) sales, thus leaving the food value chain at the earliest stages. Higher-income rural households have very little direct participation in livestock production. Despite this, they receive the largest absolute multiplier benefit, almost entirely indirectly from food processing and retailing. These more complex downstream linkages to food-value creation are the key to higher aggregate income gains for this group and have important implications for the net results of subsectoral policies. Given higher-income groups generally have more indirect linkages to the livestock sector, they may capture a large percentage of gains, even from policies targeted elsewhere (ibid.).

As the agricultural economy develops, and average per capita incomes increase, the staple crops will recede in importance in the consumption patterns in the domestic economy. The stimulation of agricultural productivity growth should not be confined to a single sector (e.g., staple crops) but geared toward productivity growth in a more diversified agricultural economy [Timmer 2005]. With a larger size of the livestock subsector, the contribution to growth in the agriculture sector is expected to become more pronounced. Key to a pro-poor character of such growth is that policies should be fashioned so as to allow smallholders and the rural population to be able to remain as productive participants as the livestock industry grows, whether as direct producers or processors, or workers along the supply chains leading to major consumption centers.

References

Adams R.H. Jr. [2004] "Economic growth, inequality and poverty: estimating the growth elasticity of poverty", *World Development* **32**(12): 1989-2014.

Balisacan, A.M. [2007] "Why does poverty persist in the Philippines? Facts, fancies, and policies", SEARCA Agriculture & Development Discussion Paper Series No. 2007-1, March.

Chen, S. and M. Ravallion [2007] "The changing profile of poverty in the world", 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

Diaz-Bonilla, E. [2007] Global macroeconomic developments: the implications for poverty. 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

Dollar, D. and A. Kraay [2002] "Growth is good for the poor", *Journal of Economic Growth* 7(3): 195-225.

FAOSTAT, FAO Statistics Division [2010]. FAO statistical databases: food balance sheet statistics. http://faostat.fao.org/site/617/DesktopDefault.aspx. Accessed July 2010.

Haggblade S., P. Hazell, and T. Reardon [2005] "The rural non-farm economy: pathway out of poverty or pathways in?" International Food Policy Research Institute, Overseas Development Institute, and Imperial College London. Proceedings from the research workshop on the future of small farms, June 26-29, Withersdane Conference Centre, Wye, UK.

Klasen, S. [2007] "Determinants of pro-poor growth", 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

Lopéz, J.H. [2006] "The relative roles of growth and inequality for poverty reduction" in: G.E. Perry, O.S. Arias, J.H. Lopez, W.F. Maloney, and L. Serven, *Poverty reduction and growth: vicious and virtuous circles*. Washington, DC: The World Bank.

Otte, J., A. Costales, J. Dijkman, U. Pica-Ciamarra, T. Robinson, V. Ahuja, C. Ly, and D. Roland-Holst [in press]. Livestock sector development for poverty reduction: an economic and policy perspective. Rome: Food and Agriculture Organization.

Ravallion, M. [2007] "Economic growth and poverty reduction: do poor countries need to worry about inequality?" 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

Ravallion, M. and S. Chen [2003] "Measuring pro-poor growth", *Economics Letters* **78**(1): 93-99.

Robinson, T. and F. Pozzi [forthcoming] "Mapping projected demand for and production of livestock commodities", PPLPI Working Paper, Pro-poor Livestock Policy Initiative (PPLPI). Rome: FAO.

Roland-Holst, D. and J. Otte [2006] "Livestock and livelihoods: development goals and indicators applied to Senegal", FAO-PPLPI Research Report No. 06-08.

Timmer, P. [2005] "Agriculture and pro-poor growth: an Asian perspective", Centre for Global Development Working Paper No. 63. Washington, DC.

Valdés, A. and W. Foster [2005] "Reflections on the role of agriculture in pro-poor growth", International Food Policy Research Institute, Overseas Development Institute, and Imperial College London. Proceedings from the research workshop on the future of small farms, June 26-29, Withersdane Conference Centre, Wye, UK.

Valdés, A. and W. Foster [2007] "Economic reform to stimulate growth and reduce poverty: the Latin American experience", 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

World Bank [2007]. World development report 2008: agriculture for development. Washington, DC: The International Bank for Reconstruction and Development/The World Bank.