Research Report

PPLPI's Livestock Development Goals: Application of LDG1 to Peru, Senegal and Viet Nam

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Abstract

Although the poor constitute a majority in developing countries, their circumstances vary in significant ways between and within their economies. To improve their livelihoods, a better understanding of this heterogeneity is essential. This report examines poverty from the perspective of livestock dependence, an essential characteristic of rural and peri-urban households in developing countries.

We find that livestock dependent populations are more likely to be poor, but the degree of their poverty depends on complex local circumstances, including the extent of formal sector participation, property rights, and access to capital. Our insights suggest that more determined efforts to promote smallholder livestock production can be a potent catalyst for poverty alleviation, but that policies aimed at promotion of smallholder livestock keepers need to be carefully targeted and that although they can bring a large proportion of the poor over the poverty threshold, there are circumstances in which they will not reach the poorest population.

Both poverty and livestock dependence are complex economic conditions, and policies must address this to be effective. More detailed insight into the economics of livestock can, however, make important contributions to poverty reduction.

1. Introduction

Animals are an essential asset to the rural poor, both those directly engaged in agricultural production and poor non-farm rural households who rely on local production for affordable nutrition. However, livestock's potential to improve livelihoods of the rural poor depends on complex economic linkages and behaviour and the challenge is to translate livestock dependence into a sustained source of income growth.

As part of its commitments to advancing livestock's contribution to poverty alleviation, FAO's Pro-Poor Livestock Policy Initiative (PPLPI) has formulated a set of overall livestock sector development objectives and is developing metrics to assess progress toward them. The objectives cover not only direct economic contributions from livestock production, but a variety of other welfare criteria associated with this economic activity, nutrition, including hygiene and disease risk, and sustainable agricultural practices. These objectives have been named the Livestock Development Goals (LDGs) to evoke their close relationship with the more general Millennium Development Goals (MDGs) promulgated by UN institutions to assess progress in global living standards. While the livestock development goals and indicators are of independent relevance and interest to PPLPI and livestock policy makers, their conformity with the MDGs recognizes the usefulness of the latter in the international development dialogue and is also intended to emphasize the integral contribution of livestock to improving the livelihoods of the majority of the world's poor who live in rural areas.

To give empirical substance to these goals, PPLPI proposes a series of quantitative progress indicators. These indicators offer a means to draw upon the immense and diverse reserve of household survey and other data that has been assembled in developing countries, each distilling raw data to better interpret the effectiveness of development policies *ex post*, concurrently, and even (using simulation methods) *ex ante*.

By establishing standards and metrics as well as supporting policy dialogue, it is hoped that PPLPI can contribute to more effective development strategy in its own programs and in the larger universe of rural, agricultural, and food oriented policy.

In this note, we focus of the first Livestock Development Goal, describe four related Livestock Development Indicators (LDIs), and apply these to data from Senegal, Peru and Vietnam.

PPLPI's Livestock Development Goals

Goal 1: <u>Eradicate extreme poverty</u>*: Halve between 1990 and 2015 the proportion of livestock dependent people whose income is less than 1$/day.*

Goal 2: <u>Increase smallholder food security and protein sufficiency</u>*: Promote gender-balanced policies to enhance the role livestock as a source of income and protein. Reduce by 2/3 malnutrition among smallholders by 2015.*

Goal 3: <u>Increase smallholder value-added</u>*: Double budgets for public investment enhancing smallholder access to extension services and markets by 2015, with emphasis on public actions that raise productivity and reduce livestock market distortions.*

Goal 4: <u>Improve animal health and welfare</u>*: Promote higher standards for animal health, husbandry, including hygienic and humane production and processing practices.*

Goal 5: <u>Combat epidemic and zoonotic diseases</u>*: Avert major epidemics and reduce the incidence of transboundary animal diseases and zoonoses by 1/2 by 2015.*

Goal 6: <u>Ensure sustainability of livestock keeping</u>*: Integrate the principles of sustainable development into livestock policies and programs. Avoid overstocking and promote sustainable patterns of land and water use, agrochemical and pharmaceutical application.*

Goal 7: <u>Conserve indigenous livestock varieties</u>*: Maintain a complete inventory of domestic livestock varieties, including detailed scientific and economic descriptions, and promote conservation of legacy genetic material.*

Goal 8: <u>Develop a global partnership for pro-poor livestock policy development, market standards and technology sharing</u>*: Establish networks for dissemination and sharing of intellectual property, genetic material, and technologies related to livestock production, processing and marketing.*

2. Indicators for LDG 1

To begin, we define the Livestock Dependent (LD) population as the population headcount, weighted individually by livestock income as a share of total income.

Livestock Development Indicators for Goal 1: Eradicate Extreme Poverty

1. Livestock Dependent (LD) population living below $1 (PPP) a day
2. LD population living below the national poverty line
3. Poverty gap ratio (incidence x depth of poverty)
4. Share of poorest quintile in national consumption

2.1 Proportion of Livestock Dependent Population Below $1 (PPP)/day

Definition[1]

Proportion of LD population below $1 per day (extremely poor) is the percentage of the population living on less than $1.08 a day at 1993 international prices, with each income unit of the population weighted by the share of livestock income in total income.[2] The $1 a day poverty line can be based on expenditure or income per person and includes consumption from own production and income in kind. Because this poverty line has fixed purchasing power across countries or areas, the $1 a day poverty line is often called an absolute poverty line. The indicator allows for comparing and aggregating progress across countries in reducing the number of people living under extreme poverty and for monitoring trends at the global level.

Method of Computation

The basic formula for this indicator is a headcount poverty measure, defined with respect to an exogenously specified poverty line and formally expressed as follows:

$$LDI1.1 = \frac{q_{LD}}{n_{LD}}$$

where

$$q_{LD} = \sum_{i=1}^{q} \lambda_i = \text{cumulative livestock dependence among the poor}$$

$$n_{LD} = \sum_{i=1}^{n} \lambda_i = \text{cumulative livestock dependence in the population}$$

λ_i = share of livestock income in total income of household i

International poverty is regularly based on a $1 a day poverty line. Estimates are based on income or consumption levels derived from household surveys. In much development work, expenditure data are deemed more reliable indicators of living standards. For the present work, however, households are classified by income sources to identify the degree of their economic dependence on livestock. The distribution of income (or consumption) is estimated using

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[1] The specification of several LDGs draws heavily upon the precedence of MDG work by other UN/CGIAR institutions and the World Bank in particular.
[2] Livestock income includes sales of animals, animal products, and household consumption of livestock products

empirical Lorenz (distribution) curves weighted by household size. In all cases measures of poverty to obtain Lorenz curves are calculated from primary data resources rather than existing estimates.

Prevalence of extreme poverty in a country is estimated by converting the $1 a day poverty line to local currency using the latest purchasing power parity (PPP) exchange rates for consumption taken from World Bank estimates. Local consumer price indices are then used to adjust the international poverty line in local currency to prices prevailing around the time of the surveys. This international poverty line is used to quantify the number of people below the $1 a day threshold.

The PPP-based international poverty line is required only to allow comparisons across countries and to produce estimates of poverty at the aggregate level. Most countries also set their own poverty lines (see indicator 1.2).

2.2   Percent of LD Population Below the National Poverty Line

Definition

The poverty headcount ratio is the proportion of the national population whose incomes are below the official threshold (or thresholds) set by the national government. National poverty lines are usually set for households of various compositions to allow for different family sizes. Where there are no official poverty lines, they may be defined as the level of income required to have only sufficient food or food plus other necessities for survival. This indicator allows for monitoring the proportion of the national population that is considered poor by a national standard. Most poverty analysis work for countries is based on national poverty lines. National poverty lines tend to increase in purchasing power with the average level of income of a country.

Method of Computation

Household income (or consumption) and its distribution are estimated from household surveys (see indicator 1.3). The incomes of various household types, by composition, may then be compared with the poverty lines for those types of household. If the poverty lines are expressed in terms of income per adult equivalent or some similar measure, the incomes of the households must be measured on a similar basis. Household income may be converted to income per adult equivalent by using the modified equivalence scale of the Organisation for Economic Co-operation and Development (OECD) - in which the first household member over 16 equals 1, all others over 16 equal 0.5, all under 16 equal 0.3 - or some other equivalence scale. Household

incomes are then divided by the 'equivalized' number of people in the household (two adults would equal 1.5 according to the OECD scale) to establish income per person.

Once the number of households that are below the poverty line has been estimated, the number of people in those households is aggregated with livestock dependency weights to estimate the percentage of the LD population below the line.

2.3   Poverty Gap Ratio (incidence x depth of poverty)

Definition

The poverty gap ratio is the mean distance separating the population from the poverty line (with the non-poor being given a distance of zero), expressed as a percentage of the poverty line. This indicator measures the 'poverty deficit' of the entire population, where the poverty deficit is the per capita amount of resources that would be needed to bring all poor people above the poverty line through perfectly targeted cash transfers.

Method of Computation

The poverty gap ratio is the sum of the income gap ratios for the population below the poverty line, divided by the total population, which can be expressed as follows:

$$LDI1.3 = \frac{1}{n_{LD}} \sum_1^q \lambda_i \left(\frac{z - y_i}{z} \right)$$

where z is the poverty line, yi is the income of individual i, q is the number of poor people and n is the size of the population. The poverty gap can also be expressed (and thus calculated) as the product of the average income gap ratio of poor people and the headcount ratio, or LDI 1.1 above.

All these formulas are calculated based on data on individuals (y_i as individual income or consumption). If household-level data are used, the formulas have to be adjusted by the weight w_i, which is the household size times the share of livestock income in total income and a sampling expansion factor for every household i.

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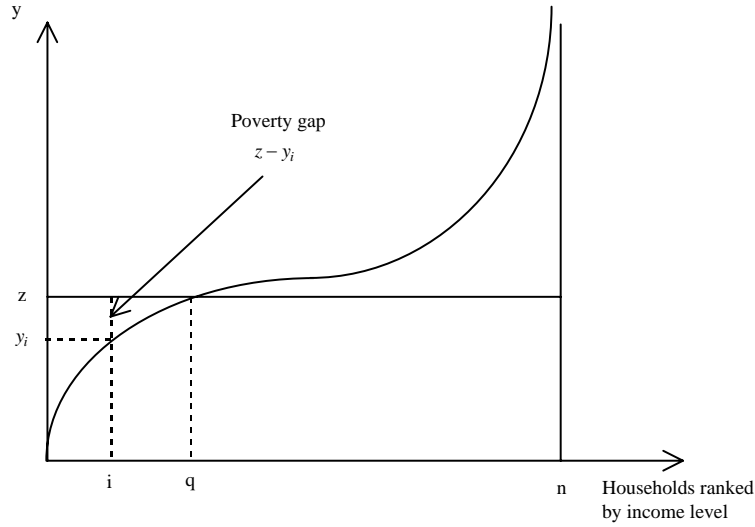
Figure 1. Poverty profile

2.4   Share of Poorest LD Quintile in National Consumption

Definition

Share of the poorest LD quintile in national consumption is an indicator of the LD population's formal sector purchasing power. Formally, we define

$$c^1{}_{LD} = \sum_{i=1}^{Q1} \lambda_i c_i$$

as the cumulative consumption within the lowest income quintile (Q1), weighted by livestock dependence. This value is then re-normalized for the full quintile population n^{Q1} as

$$\gamma^1{}_{LD} = \frac{c^1{}_{LD}}{\sum \lambda_i} n^1, \; where \; n^1 = Ord(Q1)$$

This indicator imputes consumption to the entire lowest quintile, based on consumption weighted by livestock dependence.   This can be contrasted with the conventional lower quintile consumption measure, the consumption of the poorest fifth, expressed as a percentage of total household income.

3. Poverty and Livestock Dependence in Peru, Senegal & Vietnam

In this section, we apply the four LDI's for LDG 1 to examine the relationship between livelihood and livestock in greater detail, using the cases of Senegal, Peru, and Vietnam as examples. The indicators were calculated from the Enquête Sénégalaise après des ménages in 1994-1995 (ESAM I), the Encuesta Nacional de Hogares 2001 (ENAHO) and the 2000 Vietnamese Household Living Standards Survey (VHLSS).

Table 3.1 compares the overall, national indicators (denoted MDI1.1 to MDI1.4) with their counterparts (LDI1.1 to LDI1.4) adjusted for livestock dependence of the population.

Table 3.1: Indicators for MDG 1 and LDG 1 for Senegal, Peru and Vietnam

Indicator	Peru	Senegal	Vietnam
MDI 1.1: Proportion below international poverty line	11	43	5
LDI 1.1: Proportion LD below inter national poverty line	39	59	7
MDI 1.2: Proportion below national poverty line	41	71	29
LDI 1.2: Proportion LD below national poverty line	71	71	38
MDI 1.3: Poverty gap ratio	32	35	24
LDI 1.3: LD poverty gap ratio	18	35	18
MDI 1.4: Share of poorest quintile in consumption	6	9	9
LDI 1.4: Share of poorest LD quintile in consumption	6	5	7

In the case of Senegal and Peru, we see that among the livestock dependent population rates of extreme poverty (based on the international poverty line of 1$ a day) are between 20 and 30 percent higher than for the population as a whole, while for Vietnam the difference between MDI 1.1 and LDI 1.1 is less than 2 percent. In Vietnam, livestock rearing (especially poultry) is a ubiquitous activity in both the rural and peri-urban areas, and thus implicates most of the poor. By contrast, livestock rearing in Senegal and Peru is concentrated among rural populations with much lower average incomes than even the lower deciles of urbanites. This higher representation of livestock dependent people among the extreme poor by in these two countries reinforces the importance of livestock as a target for rural poverty alleviation.

When national poverty lines are applied (MDG1.2, LDG1.2), both indicators become more inclusive. There is also a degree of convergence between the indicators because higher

thresholds blur the distinction between rural and urban as well as extreme and moderate poverty. While the national indicators enlarge the agenda for domestic poverty reduction, it is important to remember that the degree of poverty is a deficiency indicator for basic human needs. Effective policies should recognize that some poor populations are meeting less of their basic needs than others, and include components to address those deficiencies. The first livestock development indicator (LDG1.1) clearly reveals that livestock policy is relevant to lower income strata among the poor.

The results for indicators 1.3 and 1.4 reveal the diversity of livestock rearing in developing countries. In Senegal, the majority of poor households are subsistence rural families who depend on livestock for a large share of subsistence and the small amount of income they need for marketable consumption. Because of this, this population includes the poorest and also those with the highest subsistence rates (i.e. smallest marketed consumption shares). For the Senegalese livestock dependent, the poverty gap is as large as that of the nation as a whole (i.e. average), but their consumption share is half that of the poorest national quintile because urbanites are more articulated into the formal economy (i.e. have higher rates of marketable consumption).

In Vietnam and Peru, another pattern emerges which reveals the capital constraints that exist for livestock production outside subsistence populations. When large poor populations are concentrated, particularly in peri-urban areas, the opportunity cost of space rises and keeping animals requires commitment of financial resources and property rights. This poses a hurdle for the poorest populations in such countries, and thus we see that the livestock (income) dependent in Vietnam and Peru do not include the poorest households because these are either landless or too poor to invest in this (semi-formal) activity. For this reason, the livestock dependent are poorer than national averages, but closer to the poverty line than the extreme poor (i.e. LDG1.3<<MDG1.3). This means that targeted livestock policies in these countries can bring a large population over the poverty threshold, but will not reach the poorest population. In Senegal, by contrast, livestock policy can be relevant to the poorest populations, but their remoteness and lack of market participation will require determined targeting.

Consumption patterns among the livestock dependent in Vietnam and Peru are fairly representative of the national poor population. This is to be expected because of the high concentrations of urban and peri-urban poor and their greater degree of formal sector participation.

4. Conclusions

Even with a few comparison cases, it is evident that the 'livestock perspective' gives fruitful insights for development strategy generally and poverty reduction in particular. The livestock dependent are more likely to be poor, so policies targeted toward improving the livelihoods of smallholder livestock keepers are inherently pro-poor.

When livestock dependence is concentrated among subsistence producers, livestock policy can be more challenging but more directly beneficial to the poorest populations. This generally means basic extension services to improve local nutritive yields via improvements in basic husbandry, animal health, and genetic material. When livestock producers are already articulated into the formal economy, especially in peri-urban areas, livestock policy can advance the cause of poverty reduction more efficiently, but it must address different challenges, including property rights, financial constraints, and market participation.

5. References and Further Reading

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