SUPPLEMENTARY MATERIAL

Table S1. Estimated cattle body weights and calculated conversion factors for crossbreeding between East Africa short horn Zebu cattle and Borana/Sahiwal cattle. * Factors are calculated conversion weights based on comparison of published body weights to a 250-kg female Zebu cow (Bekure et al. 1991).

Cattle Age/Sex Classes	Zebu 100 % (kg)	*Factor	75% Zebu 25% improved (kg)	Factor	50% Zebu 50% improved (kg)	Factor	25% Zebu 75% improved (kg)	Factor	100% improved (kg)	Factor
Calves	100	0.40	106	0.42	111	0.46	117	.47	122	0.48
Heifers	174	0.70	184	0.73	193	0.77	203	.81	212	0.85
Immature Steers	171	0.68	181	0.72	190	0.76	200	.80	209	0.84
Mature Steers	262	1.05	303	1.21	345	1.38	386	1.54	427	1.71
Cows	250	1.00	273	1.09	296	1.18	319	1.27	342	1.36
Bulls	322	1.29	361	1.44	401	1.60	440	1.76	479	1.91

Body masses are for 100% small east African zebu from Bekure et al. (1991) and Rutten (1992). Body mass for Boran and Sahiwal mature female cows, calves, steers and bulls estimated from King et al. (1984), Trail and Gregory (1984), Demeke et al. (2003), and Demeke et al. (2004). Body mass for 100% improved heifers and immature steers estimated from the same literature. Intermediate levels of crossbreeding estimated as intermediate body mass points between 100% local and 100% improved animals.

Table S2. Estimated sheep body weights and calculated conversion factors for cross-breeding between Red Maasai and Dorper, Merino, and Somali Blackhead sheep.

Sheep Age/Sex Classes	100 % local (kg)	*Factor	75% local 25% improved (kg)	Factor	50% local 50% improved (kg)	Factor	25% local 75% improved (kg)	Factor	100% improved (kg)	Factor
Juveniles (6 mos.)	15.2	0.06	17.1	0.07	19.9	0.08	22.5	0.09	24.5	0.10
Females	30.2	0.12	32.9	0.13	34.4	0.14	36.5	0.15	38.5	0.15
Males	37.5	0.15	38.8	0.16	40.1	0.16	41.4	0.17	42.7	0.17

Body masses for 100% Red Maasai sheep estimated from de Haas et al. (1975) and Baker et al. (2002). Body mass for 100% Dorper, Merino and Somali Blackhead sheep synthesized from Chemitei et al. (1975) and Wilson (1991). Body mass for intermediate levels of crossing estimated from all sources.

Table S3. Estimated goat body weights and calculated conversion factors for levels of crossbreeding between Small East African goats and Galla/Long eared Somali Goats.

Goats Age/Sex Classes	100 % local (kg)	*Factor	75% local 25% improved (kg)	Factor	50% local 50% improved (kg)	Factor	25% local 75% improved (kg)	Factor	100% improved (kg)	Factor
Juveniles (6 mos.)	15.5	0.06	16.1	0.06	16.8	0.07	17.4	0.07	18.0	0.07
Females	31.0	0.12	32.4	0.13	33.8	0.14	35.2	0.14	36.6	0.15
Males	40.0	0.16	40.7	0.16	41.2	0.16	41.6	0.17	42.3	0.17

Body Masses for 100% small east African goat varieties estimated from de Haas and Chemitei (1973) and Wilson (1991). Body mass for 100% improved Galla and Long eared Somali goats calculated from Githae et al. (1975), Wilson and Light (1986). Body mass for intermediate levels of crossing estimated from all sources.

Table S4. HH Characteristics identified during wealth ranking.

Wealth Groups	Older Respondents: 50 years+ (N=4)	Younger Respondents: 25-30 years (N=4)
Very Poor	No/few animals Supported by others No wife, no children	Has land – but clear that land will be sold in the future (Osilalei)
Poor	10-80 cattle 10-30 sheep/goats No 'future prospects' Sons working for others No agriculture Family small or large, not well-taken care of Physical wealth impaired (clothing, and health) May be supported by others Someone may be drinking	 No employment No businesses Do not have things Large families with few animals Children in school, but may be assisted (by group ranch) and do not finish
Intermediate	80-200 cattle 40-200 sheep/goats Some have small businesses or employment, but focusing on LS Doing agriculture -May/may not be working agricultural plot -could rent it out Organised families, well taken care of Can support one's own family	20+ cattle /30+ sheep/goats if still young and doing things in addition to livestock Some have built houses, but sold livestock to do it Schooling children
Rich	150-400+ cattle 100-400+ sheep/goats Built houses Purchased a water pipeline connection Purchased plots for business or agriculture – Are future focused Have two settlements (livestock and agriculture) Many wives, many children Takes care of others (food, clothing or animal gifts for milking or marriage)	>100 cattle 200+ sheep/goats Sons working – but still concentrating on livestock Using their animals - 'putting them to work' Purchasing Vehicles, doing other businesses – because doing only livestock is risky Families can be big or small Kids are schooling
Very Rich	500+ cattle, 'too many sheep/goats to count' Using their animals (for businesses) Supporting others	

Table S5. Cross-tabulation of DW metric and $/Day Poverty Measure

	Average daily value of income/assets per person (US$)*			
Diversified	< $1/Day**	$1-$1.99/Day	>$2/Day	Total HHs
Wealth Ranking	% #	% #	% #	#
Poor	62.1 54	12.8 6	2.0[a] 1	61
Intermediate	36.8 32	48.9 23	14.0 7	62
Rich	1.1[b] 1	38.3 18	84.0 42	61
Total	100.0 87	100.0 47	100.0 50	184
% of Total HHs	47.3	25.5	27.2	100.0

* Average daily values calculated based on total standing household assets and income, divided by no. of individuals in a household, and 365 days/year.

** $1/day is used here to reflect the commonly cited global cut-off point for extreme poverty.

a. This HH was categorised by DW, WR and BA-TLUs metrics as poor although the poverty metric categorises the HH as making >$2/day. The HH consists of a single, male teacher with no LS, but a monthly salary.

b. This HH was categorised by DW, WR and BA-TLUs metrics as rich, but based on large HH size (n=21), daily $ value per person was <$1/day.

Appendix I: DW calculation

Diversified wealth (DW) is calculated based as the sum of HH assets (A) and income flows (IF):

$$DW = A + IF$$

E1

HH assets (A) are the sum of 1) HH herds based on the number of livestock (LS) multiplied by the average selling price of age/sex classes of LS documented throughout the study period, and 2) the value of a HH's capital assets (LS + fixed capital assets).

$$A = A_{LS\ (cattle + sheep/goats)} + A_{capital}$$

E2

Cultivated area size (ha) is added as an additional asset type to the DW measure.

Income flows (IF) are parameterised as:

$$IF = LS_{net} + \text{Wages and Salaries} + \text{Business} + Ag_{net}$$

E3

where the value of net LS production is,

$$LS_{net} = \text{Gross LS income} - \text{LS costs/outflows}$$

E4

Gross LS income is the summed value of LS sold, received (gifts), and consumed (slaughtered), hides and skins sold, and milk consumed and sold. LS costs and outflows are the sum of LS purchased and given, LS mortality, and LS expenditures (e.g. water, acaracides, veterinary drugs, feed supplements, pasture rental and hired herders). The difference between gross LS income and LS production costs/outflows is net LS income.

The value of wages/salaries is the sum of activities accruing to all members of a HH at weekly, monthly or intermittent time steps, including remittances from HH members working elsewhere. Business income is calculated as rental income (houses, agricultural land or business plots) and self-employed activities (see BurnSilver (2009) for additional detail).

Net agriculture income is the net value of all harvested agricultural crops over the one year period.

$$Ag_{net} = (Ag_{consumed} + Ag_{sold}) - Ag_{costs}$$

E5

The crops of some HHs were still in the ground at the end of 2000. These crops are not counted in agricultural income, so this income is undervalued for some HHs. Gross agricultural income is calculated as market value of consumed agriculture ($Ag_{consumed}$) (corn and beans) and sold crops (Ag_{sold}) (tomatoes, onions, peppers, some beans). Values for consumed products are self-reported local market price per crop. Costs (Ag_{costs}) accruing to HHs based on ground preparation, labour, pesticides, fertiliser, and seed costs are subtracted from gross agricultural income and yields net income per HH from cropping activities (Ag_{net}, E5).

All LS figures include transactions of both cattle and smallstock. All values are presented in US$. See BurnSilver (2009) for additional detail on the DW metric.