Dietary Energy Balance: Calories Available vs. Calories
Exerted (A 50% Deficit) - RL Tinsley

Dietary Energy Requirement:
- Basic Metabolism 2000 kcal/day
- Manual labor 300 kcal/hr including basic metabolism (net 220 kcal/hr additional)
- 8 hour work day requires \((2000 + (220 \times 8)) = 3760\) Kcal or rounded to 4000 Kcal/day
- What constitutes 4000 Kcal?

How much time would it take to consumer any example of 4000 kcal?

Commentary:
- Typically smallholders will have access to only 0.5 to 0.75 of the dietary calories needed for a full day of agronomic field work.
- After accounting for basic metabolism this results in a diligent work day of zero to 4 hrs. and becomes a major impediment to implementing development innovations designed for their benefit.
- It may sound trivial that you cannot expect a hungry person to work hard, but isn’t that what we have expected for the past 40 years?
- Contrary to traditional belief, instead of being labor surplus, most smallholder communities are severely labor deficient.
- Also, smallholder farmers cannot risk averse in establishing their crops but are mandatory risk takers, with their very survival depending on it. Any deliberate delay only reduces the total area cultivated and risks food security.
- Reviewing the stereotype of African males loafing around the village in the afternoon, what is more likely: they are lazy in need of some form of motivation, or hungry and exhausted in need of a good hearty meal?
- Who is, or should be, responsible to determine the operational limits of smallholder farmers, caloric or otherwise? Is this an administrative void in the development effort!!?
- What is the possibility the apparent limited acceptance of agronomic recommendations is an optimizing the recommendations to the limited operational capacity of the farmer including limited labor? Most affected would be time of planting, plant populations, quality of weeding, etc.

Potential hours of diligent labor:
- From 3000 kcal/day must subtract 2000 kcal/day for basic metabolism
- 3000 – 2000 = 1000 to be allocated for manual labor
- Working longer would imply pacing to reduce amount of calories exerted or starving.
- To diligently work a full 8 hrs./day requires a diet of at least 3750 kcal.
- While the case study is for purchasing power of casual wages, subsistence stock are similar with Malawian farmers holding 200 kg of maize per adult and Millennium Village Project in Africa* holding 1.1 MT of maize per family of 5.7, both result in daily diet of slight less than 2000 kcal. Meets basic metabolism, but limited work unless supplemented

Implications for Poverty Alleviation
- Assisting smallholders needs to emphasis drudgery relief and avoid labor intensive innovations.
- This quickly implies enhancing access to mechanization (All mechanization was under the development community’s radar and not acknowledged in any reporting)
- • Asian solution for rice was shift from buffalo to power tillers
- • Double the farm size from 1.5 to 3 ha.
- • How much of success of the green revolution in Asia was technology vs. concurrent shift to power tillers? If left only with buffalo how limited would this area be?
- • Now Asia mechanizing harvest with small combines increasing crop intensity to 5 rice crops in 2 years.
- • African solution slowing getting access to contract tillage
- • If women are equally undernourished relative to their work requirements, and domestic work takes priority over economic work, how will that effect income generation for women or women groups?
- • Indirect methods of drudgery relief (domestic drudgery)
- • Grain mills
- • Improved domestic water supply
- • What would be the agronomic impact on these innovations?
- • Development project need to assess dietary energy when promoting innovations
- • Nutrition studies need to be based on providing a balanced diet of at least 4000 kcal.
- • Likewise, wages need to be based on ability to buy a balanced diet of at least 4000 kcal.

Survey
1. Given the current interest in improving the quality of diet of smallholders to address malnutrition in terms of limited protein, along with various vitamins, minerals, etc., from the farmers’ perspective what will be the higher concern, improved nutrition or sufficiency calories to complete the day’s task? Note the improved nutrition virtually always cost more, thus it can only be done by reducing the caloric intake, and work hours.
2. If we advocate innovations that require smallholders to routinely exert more caloric energy than they access to, are we inadvertently promoting their genocide by starvation as a crime against humanity subject to referral to the International Criminal Court (ICC) in The Hague?

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References
- www.smallholderagriculture.com
- ECHO Development Notes: Issue 121, October 2013
- Ethiopia Case Study: http://human.colostate.edu/~rltinsley/EthiopiaDist.html

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