

Increasing smallholder pig farmers' adaptive capacity: Low-cost balanced diets for East African pigs using livestock and plant co-products



Natalie Carter^{1,2}, Catherine Dewey¹, Delia Grace²,
Ben Lukuyu² and Cornelis F.M. de Lange¹

¹University of Guelph ²International Livestock Research Institute

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Central Region, Uganda

Western Province, Kenya



Photo: N.Carter

Central Region Western Province,
Uganda Kenya



Pork consumption increased ten-fold in past 30 years
Pig population increased from 200,000 to 3.2 million (UBOS 2011)



Photo N.Carter



Photo doomsteaddiner.org,



Photo N.Carter

- > 30% of East Africans are under-nourished (faostat.org)
- Pork production = income and animal source protein

Average daily gain is low (130 ± 2 grams/day)



Carter, N. A., Dewey, C., Mutua, F., de Lange, C., & Grace, D. Tropical Animal Health and Production. 2013;45 (7), 1533-1538.

Rationale

- Pigs growing slowly
 - lack feed and balanced diets
 - expensive commercial feed
 - seasonal feed shortages and surpluses
 - inadequate storage of surplus
 - people and pigs compete for same food (Mutua et al. 2011; Mutua et al. 2012; Kagira et al. 2010)
- Below-potential earnings
- Better growth = more income (Levy et al. 2014)
- Low-cost balanced diets – seasonal, local, co-products, free (Levy et al. 2014)
- Randomized control study

Levy, M., Dewey, C., Weersink, A., Mutua, F., **Carter, N.**, Poljak, Zvonimir.
Tropical Animal Health and Production. 2014;46 (5), 797-808.

Home-grown fresh feedstuffs



Photo: N. Carter

Jackfruit



Photo: C. Dewey

Banana



Photo: C. Dewey

Pumpkin



Photo: N. Carter

Ripe avocado



Photo: C. Dewey

Sweet potato

Purchased feedstuffs

Sun-dried fish



Cottonseed meal



Maize bran



Iodized table salt

Agricultural co-products



Sweet potato vine



Cassava peel



Papaya leaf



Banana leaf

Forage-based diet



Photo: N. Carter

Forage-based diet



Photo: N. Carter

Ingredients in forage-based diet: sweet potato vine, cottonseed meal, maize bran, banana leaf, sun-dried fish, iodized table salt, ripe avocado, jackfruit, mineral and vitamin premix

Silage-based diet



Silage-based diet



Sweet potato tubers



Sweet potato vines



• Making silage – compacting layers of sweet potato vines and tubers to remove air to enable fermentation •

Commercial diet - control



Photo: E. Smith

Growth study

Masaka, Uganda

- 3 diets
- Diet randomly assigned to pen – 10 pens per diet
- Pigs randomly assigned to pen
- Each pen - 3 pigs of same sex and breed (n=90)
- Local and crossbreed
- Crossbreed = local crossed with Landrace and/or Large White and/or Camborough



Photo: E. Smith

Growth study- Masaka, Uganda

- Weighed every 21 days
- 65 to 230 days of age
- Mean starting bodyweight did not differ between diets
- Commercial 6.8 ± 2.12 kg
- Forage-based 7.0 ± 3.2 kg
- Silage-based 6.7 ± 1.9 kg
 - t-test ($p > 0.5$)



Local breed pigs fed silage-based diet

Average daily gain (g/day) newly-weaned vs. finisher

	65 to 107 days of age		199 to 230 days of age	
Variable	Coefficient	P value	Coefficient	P value
Intercept ^c	224	-	503	-
Commercial diet (referent)	-	-	-	-
Silage-based versus commercial diet	-243	<0.001	-	NS
Weight at start of weigh period (kg)	10	0.008	4	0.004
Local breed versus crossbreed	-	-	-95	0.002
Adjusted r ²	0.8177		0.8433	

Average daily gain (g/day) newly-weaned pigs

Diet and (bodyweight (BW) range (kg))	Mean BW (kg) 65 days old	Mean BW (kg) 86 days old	Mean ADG 65 - 86 days old	Mean BW (kg) 107 days old	Mean ADG 86 - 107 days old	Mean BW (kg) 127 days old	Mean ADG 107 - 127 days old	Mean BW (kg) 140 days old	Mean ADG 127 - 140 days old
Commercial lightest 1/3 (4 to 5.2)	4.6	7.9	154	15.0	342	22.8	371	26.3	268
Silage-based lightest 1/3 (3.2 to 5.9)	4.7	4.5	-8	5.1	30	7.4	107	9.2	142

Farmer training and feedback workshops



Photo: N. Carter

Farmer training and feedback workshops



Photo: N. Carter



Photo: N. Carter

Conclusions

- Suitable feedstuffs available
- Seasonal shortages and human/pig competition
- Silage-diet heavier (9.2 kg) pigs can achieve good growth



Conclusions

- Enable pigs to have better growth than is currently happening
- Enable farmers to feed pigs even during seasonal shortages, weather shocks
- Improve well-being of pigs
- Improve resilience and well-being smallholder farm families



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Questions



Photo: C.Dewey