

**Enhancing Sustainable Milk Production Capacity in Cuba**  
**Report on Project Visit by Canadian Team**  
**July 28 to August 2, 2011**

## BACKGROUND



Enhancing Sustainable Milk Production Capacity in Cuba is a project of cooperation between Canada and Cuba. Started by a \$75,000 CIDA pilot study grant to Sustainable Cities in 2004, it has been supported from the outset through the volunteer efforts of co-operants Wendy Holm and the Millson family, dairy farmers from Ontario. Together, they have also raised the funds for its continuance. It is in its sixth year.

## INTRODUCTION

Wendy Holm, Jim Millson and Gladys Millson spent 6 days at the CPA in late July/early August. In the sixth year of the project, the point of our visit in August was to evaluate how close the Project was to final completion and to discuss with the CPA their agreement and possible timing for a CPA-led participatory evaluation of the project.



These priorities translated into the following objectives for our August 2012 visit:

1. Analyse how well each of the components of the project was working (rotational grazing, pedestals, ration crop production, ration mixing, calf rearing, water and shade management, irrigation); identify any impediments, and come to an understanding with the CPA members of what needs to be done to bring it to readiness for evaluation.
2. Develop a strategic plan to “connect all the dots”, ideally by March 2012 in time for the rainy season.
3. Decide on an evaluation process and measurement criteria (set of indicators).

Complementing the above, we arrived with several specific priorities:

### 1. ON FARM NUTRITION

#### 1. ROTATIONAL GRAZING

We were concerned that not enough time has been spent educating the farmers regarding the proper rotational use of the pedestals and pastures. Because we felt it was important to address this, we asked Aurelio Alvarez Mendez (IIPF) to present during our visit a workshop to those CPA members responsible for dairy cows. This was done on Monday August 1.

a. PEDESTALS

Prior to this visit, we also had concerns regarding the performance of the pedestals. (Ideally each hectare of pedestals provides rotational grazing for 5-6 high lactating cows over a 48 day rotation. So 15-18 high lactating cows in the 3 hectares of pedestals, leaving the remaining cows to graze the 30 hectares of electric-fenced pastures on a proper rotational basis.) When I visited with the students last May, the Pedestals appeared in weak condition. We wanted to understand better what the problems were and how much feed they were actually providing in rainy season and dry season.

2. RATION CROP PRODUCTION.

We supplied a feed mill and irrigation for ration crops; we were anxious to see how far the CPA had progressed in on-farm ration production.

3. WATER AND SHADE IN PASTURES

We suspected water and shade surrounding the pedestals and pastures remain an issue and wanted to raise this as well.

4. TECHNICAL SUPPORT TO THE VISIT

We felt the input from pasture and nutrition specialist Aurelio Alvarez Mendez, IIPF, was particularly important to this evaluation, and asked Aurelio if he would agree to come to the CPA for 2 days during our visit to assist in the analysis.

## PROCESS:

Wendy Holm, Jim Millson and Gladys Millson arrived in Havana on Wednesday July 27<sup>th</sup> and entered Cuba with ANAP co-operation visas.

On Thursday morning we met with Xiomara Acosta Diaz, Head of International Projects at ANAP, to discuss the above purpose and objectives of the visit and to seek her concurrence with and support for the plan for the ensuing week.

Thursday afternoon ANAP drove us to the CPA. ANAP Project Manager Juan Carlos Loyola accompanied us.

Over the next five days, we worked with the CPA members, ANAP representatives and Aurelio Alvarez Mendez (31<sup>st</sup> and 1<sup>st</sup>) to analyze/evaluate project performance.

On Saturday, the Canadian Team worked with Aurelio to develop feed formulation (ration) for the CPA's dairy cows.



Two workshops (Sunday and Monday) were held on grazing and nutrition for CPA members responsible for milk production.



Production statistics were collected from the CPA economist for the years 2005-2010 and were analyzed during the visit. A concluding workshop summarizing the findings of the visit was presented on Tuesday.



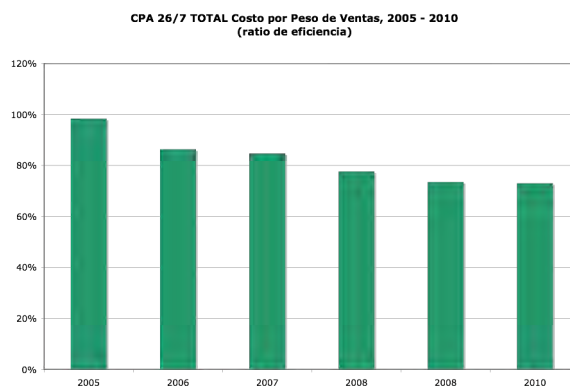
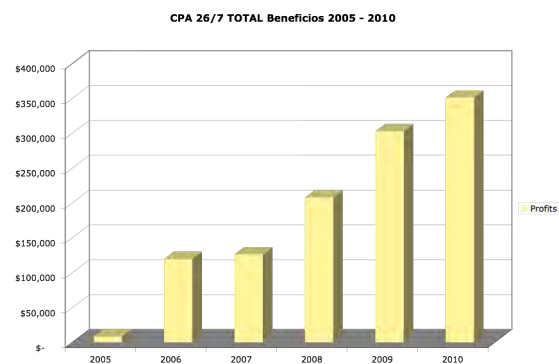
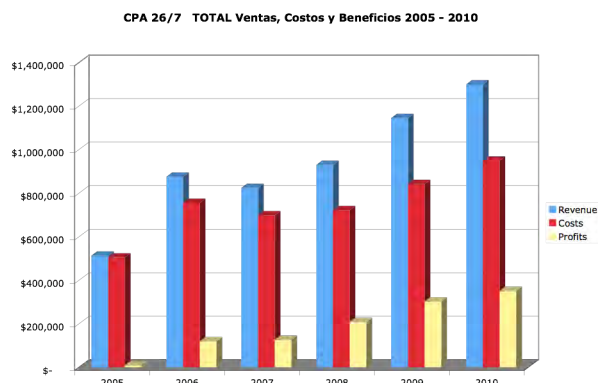
## OBSERVATIONS

Based on the 5-day visit, the following observations are made:

### GENERAL

1. Transition to a calf-rearing program is underway. Calves born to heifers (e.g. calving for the first time) are separated at birth and bottle fed then transitioned to a ration and micro rotational pastures.
2. Irrigation infrastructure is dramatically improved – an estimated 90% of improved pasture has irrigation capacity.
3. An irrigated ration crop area has been created.
4. The CPA has been fortunate to receive considerable technical support from IIPF's Aurelio Alvarez Mendez, who has taken a professional interest in the CPA and has provided considerable specialized technical support and advice.
5. Overall, the CPA has dramatically improved in income and efficiency.

The first two graph tracks sales (blue), production costs (red) and profits (yellow) for the CPA over the time period 2005 to 2010. As can be seen, sales and profits have steadily increased over this time. The third graph measures the efficiency ratio (green) – how much it costs the CPA to generate one dollar in sales. The lower the ratio, the more efficient the CPA. This shows overall efficiency has increased.

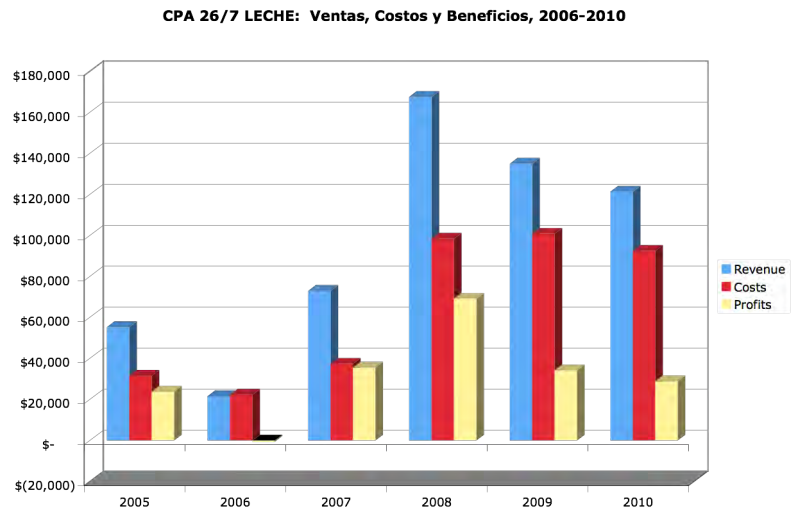




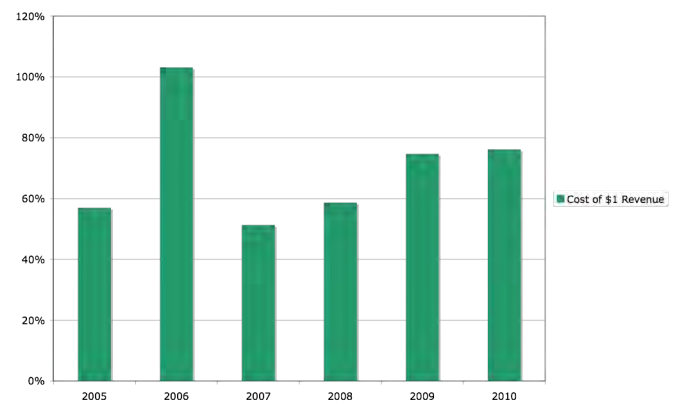
## DAIRY ANALYSIS

1. Returns and profits to milk peaked in 2008 but have declined in 2009 and 2010.

The graph to the right shows sales (blue), costs (red) and profits (yellow) from the sale of milk over the period 2005 to 2010. After peaking in 2008, both sales and profits have fallen off, while costs have remained relatively the same.



The next graph shows the milk efficiency ratio (green) – the cost to the CPA to generate one peso in milk sales. Not surprisingly given the above, the efficiency ratio has been increasing (efficiency has been dropping) since 2007.

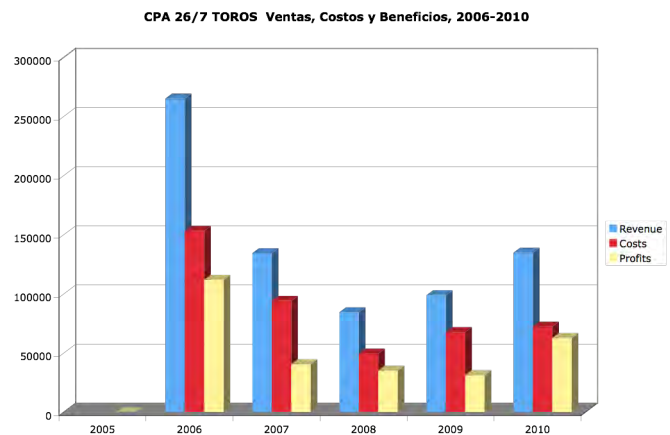


2. There would appear to be several reasons for this:
  - a. Better nutrition since 2004 has meant starvation no longer culls the herd, and animal populations (not only cows, but bulls, pig, buffalo) have increased faster than the ability of the CPA to provide feed rations.
  - b. The area planted to sugarcane, traditionally used as animal feed at this CPA, appears to have been reduced.
  - c. There have been attempts to improve production to 2008 levels by culling and replacing with cows with improved genetics, but production has still declined.
  - d. Two years of drought have reduced pasture productivity
  - e. The Pedestals have also been adversely affected.

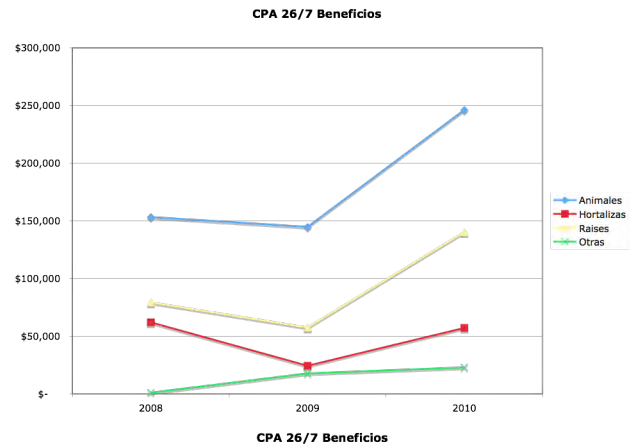
- i. The pedestal legume that was planted was Gylcenia, but another legume had infiltrated the legume beds. This “interloper” legume is susceptible to a virus which it has in fact contracted, dramatically reducing legume production.
- ii. Further reducing the productivity of the legume beds has been a drop in fertility due to low levels of potassium and phosphorous
- iii. Insufficient grazing of the pedestals (they have been in recuperation mode, so grasses have been cut by machete) has exacerbated this, reducing manure deposition.

### OTHER PRODUCTS OF THE CPA

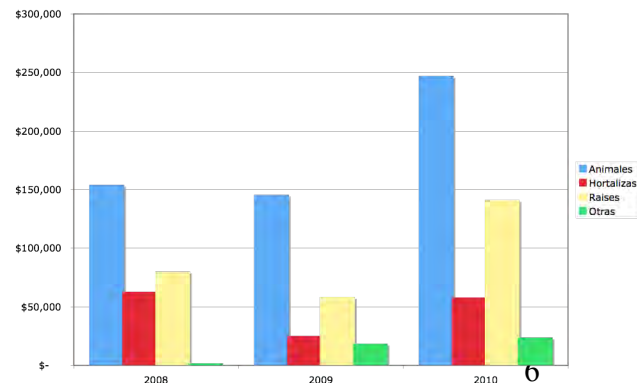
1. In comparison to milk production, which began to decline in 2008, production volumes and profits associated with meat production have steadily improved since 2008.



2. The two charts to the right compare profitability from animals (blue), root crops (yellow), vegetables (red) and “other crops” (green) produced at the CPA over the past three years.



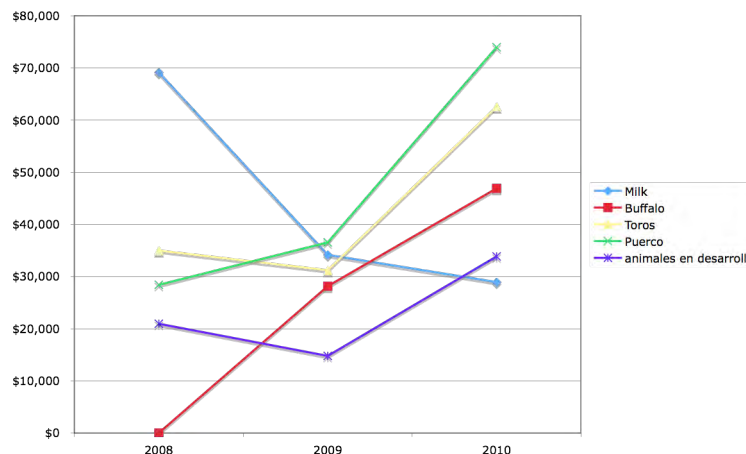
As can be seen, during this period, animals and root crops have contributed most significantly to CPA profitability.



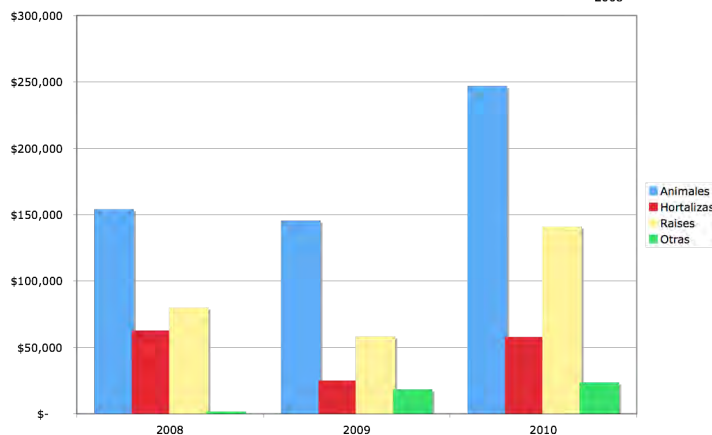
- Breaking down the animal production further, the next two charts compare production of pork (green), bulls (yellow), buffalo (red), breeding stock (purple) and milk (blue).

As can be seen from these charts, when considering CPA livestock products, porkmeat has been the top contributor to CPA profitability, followed by bulls, buffalo, breeding stock, and finally milk.

CPA 26/7 BENEFICIOS DE ANIMALES

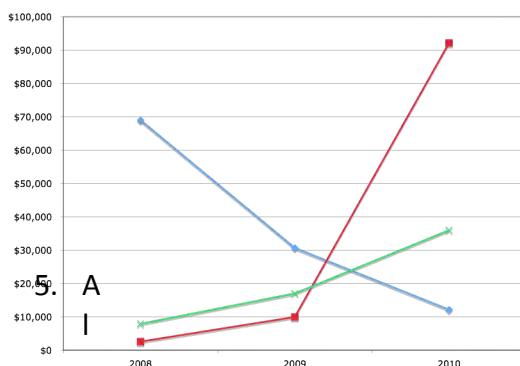


CPA 26/7 Beneficios

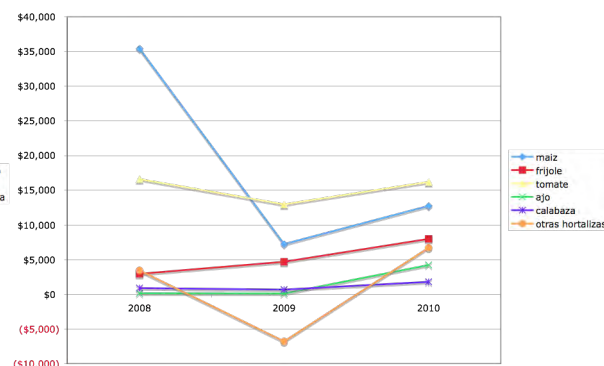


- The final two charts consider root and vegetable crops. The one on the left shows the profitability of yucca (red) over malanga (green) and boniato (blue). The one on the right compares tomatoes (yellow), corn (blue), beans (red), other vegetables (orange), garlic (green) and squash (purple).

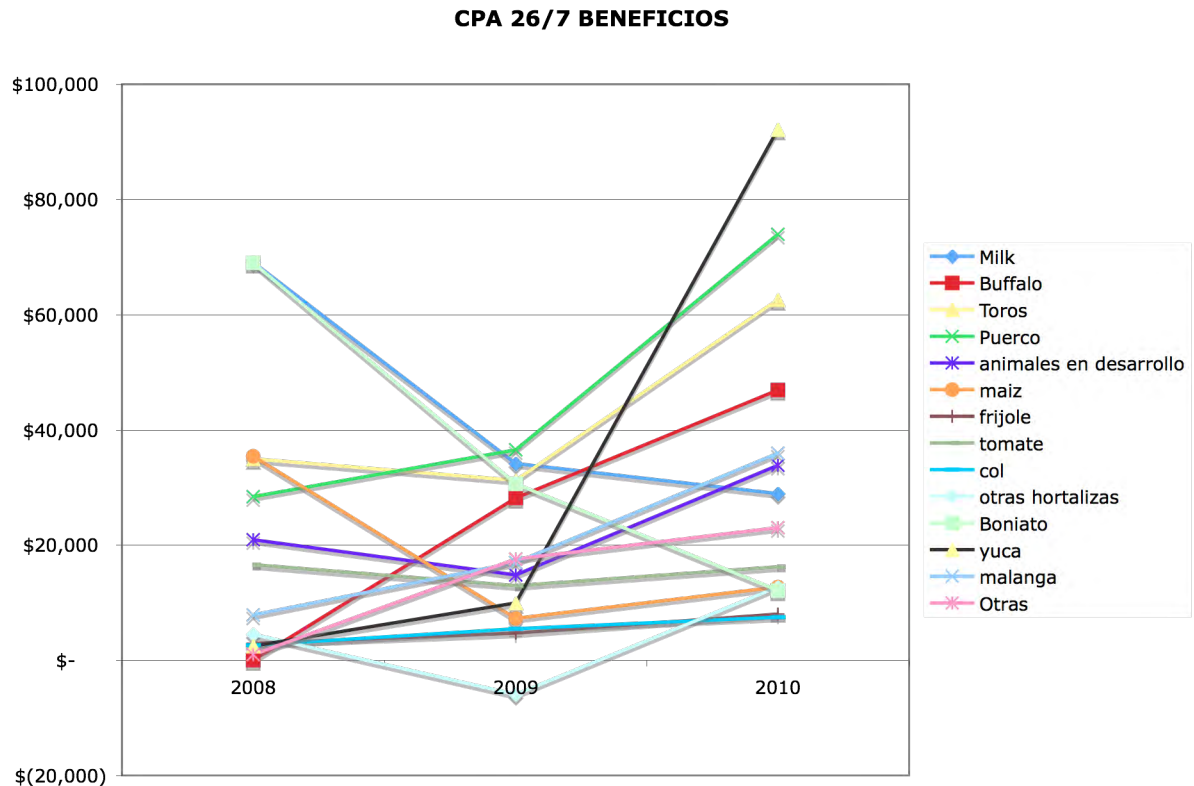
CPA 26/7 Beneficios de RAISES



CPA 26/7 BENEFICIOS DE HORTALIZAS



Although a bit complex, the chart presented on the following page compares profitability of all products produced at the CPA. During 2010, the greatest returns were gained from (respectively) sales of yuca, pork, bulls, buffalo, malanga, breeding stock and milk.



### COMPETITION FOR RATIONS: MILK versus MEAT

To understand the story behind the above graphs, it is necessary to remember again that animal numbers have outstripped on-farm feed production capacity. This puts the CPA in a difficult position: do they allocate scarce rations to maximize meat production or to maximize milk production? Looking at the economic data, it would appear that the bulls have been winning out over the cows....

Looking at it from a socialist perspective, this is understandable. The state - via it's Empresa - is pushing the CPA hard to deliver its slaughter bulls on time and at the agreed weight. It is unclear whether there is the same pressure for milk. The state wants to buy both meat and milk for the population; both are in short supply. But faced with the decision of spending scarce hard currency on imports, there is more logic to choosing skim milk powder over meat: skim milk powder is much cheaper to import and distribute than meat (which cannot be dried and powdered and held at room temp and easily distributed/reconstituted...) Moreover, skim milk powder is readily available from countries that have good trade relations with Cuba.



Looking at it from an economic perspective, the choice is less clear. The price a Cuban farmer is paid for milk has increased substantively; a clear signal from the state to raise production. But without knowing the comparative returns from meat and milk production, it is impossible to know whether the CPA's decision to feed for meat over milk is rational...

Economics notwithstanding, in the case of this particular CPA, there was another reason for them to put a big priority on milk production: the project capital and human capital and cooperation capital they have invested with the 6 year old dairy project Enhancing Sustainable Milk Production Capacity in Cuba. We suspect if there was any way the CPA could have kept the cows on a high nutrition diet, they would have done so...

What this highlights is that a greater focus on animal nutrition is required if the CPA is to fulfill its production potential.

## **NUTRITION: RATION FORMULATION AND PLANTING PLAN**

Driven by the above, and in discussion with and supported by the CPA, the feed and forage knowledge of Aurelio Alvarez Mendez and Jim Millson was harnessed to develop an on-farm nutrition program.

The plan consists of a ration formulation and a planting schedule to supply the components to the ration.



### **RATION FORMULATION**

The ration formulation is presented on the following page. It is actually an interactive model – a copy of which has been given to the CPA and to ANAP. Two rations are presented, one for the dry season and one for the rainy season. Both are based on crops already grown with success at the CPA. It assumes a Cuban cow of 400 kg and a crop year equally divided into rainy and dry seasons.

In the dry season (November to April), cattle need more energy and less protein. To receive an adequate balance, dairy cows should receive a total ration of 47.1 kg of fresh matter (13.5 kg of dry equivalent) per day of grasses, sugar cane, king grass, legumes and sorghum (produced on-farm) and Norgold (supplied by the State) in the proportions indicated in the DRY SEASON portion of the table following. This amounts to 466 kilograms of fresh matter per day for the existing dairy herd, or 2,590 tonnes of fresh mater per season.

VARIABLES			
Cuban cow weight	88.9%	days dry season	180
Number of cows	55	days wet season	180

DAIRY HERD TOTALS DRY SEASON (more energy less protein)										
Herd Feed Requirements FM/per day		Herd Feed Requirements FM per season		400 kg cow						
(kg)	tonnes	Ration per cow per day	% of total ration	Dry Matter per day (kg)	% DM	Fresh Matter per day (kg)	Energy content of dry matter (kilocalories per kg)	Protein content of dry matter (%)	ENERGY (kilocalories per kg dry matter)	PROTEIN (grams/kg dry matter)
743	134	grasses	25%	3.4	0.25	13.5	1.8	9.0%	6.1	304.0
1,062	191	sugar cane	42%	5.6	0.29	19.3	2.4	3.8%	13.4	212.8
489	88	king grass	13%	1.7	0.19	8.9	1.7	7.0%	2.9	118.2
101	18	legumes	4%	0.5	0.29	1.8	2.1	22.0%	1.1	117.3
113	20	Norgold	13%	1.8	0.88	2.0	2.6	29.0%	4.7	522.0
83	15	Sorghum	3%	0.5	0.3	1.5	2.15	7%	1.0	29.7
2,590	466		100%	13.5		47.1			29.2	1,304.1

DAIRY HERD TOTALS RAINY SEASON (less energy more protein)										
Herd Feed Requirements FM/per day		Herd Feed Requirements FM per season		400 kg cow						
(kg)	tonnes	Ration per cow per day	% of total ration	Dry Matter per day (kg)	% DM	Fresh Matter per day (kg)	Energy content of dry matter (kilocalories per kg)	Protein content of dry matter (%)	TOTAL ENERGY (kilocalories per kg dry matter)	TOTAL PROTEIN (grams/kg dry matter)
1,525	275	grasses	53%	6.9	0.25	27.7	2	9%	13.9	624.0
110	20	YUCA	8%	1.0	0.35	2.0	2.8	8%	2.8	75.0
489	88	king grass	11%	1.5	0.17	8.9	1.9	7%	2.9	105.8
287	52	legumes	11%	1.5	0.29	5.2	2.2	22%	3.3	332.4
113	20	Norgold	14%	1.8	0.88	2.0	2.6	29%	4.7	522.0
83	15	Sorghum	3%	0.5	0.3	1.5	2.01	6%	0.9	26.5
-	-									
2,606	469		100%	13.2		47.4			28.4	1,685.7

In the rainy season (May to November), cattle need less energy and more protein. To receive an adequate balance, dairy cows should receive a total ration of 47.4 kg of fresh matter (13.2 kg of dry equivalent) per day of grasses, yuca, king grass, legumes and sorghum (produced on-farm) and Norgold (supplied by the State) in the proportions indicated in the RAINY SEASON portion of the table following. This amounts to 469 kilograms of fresh matter per day for the existing dairy herd, or 2,606 tonnes of fresh mater per season.

## PLANTING PLAN

Based on the foregoing ration, a planting plan was agreed to. This plan is presented below. As can be seen from this plan, the area required for rations for the dairy herd is 20 hectares in the dry season and 10 hectares in the rainy season. The acreage required to produce each component of the dairy ration in the dry and rainy seasons are noted. The lower table represents the CPA's plan to ensure sufficient land is allocated to ration crop production in the coming year. The bottom table presents an estimation of seasonal yields for each ration crop.

PLANTING PLAN				
DRY SEASON (November - April)				
	yield (tonnes per ha)	feed needed (tonnes)	hectares needed	
Sorghum (whole plant)	7.5	15	2.0	
Legumes				
canavalia (whole plant)	12	18	1.5	
Sugar Cane	20	191	9.6	
King Grass	12 **	88	7.3	
		<b>312</b>	<b>20</b>	
Grasses		134		
Norgold		20		
TOTAL FEED		<b>466</b>		
** 2 cuts, Jan and April of 6 T each				
Rainy Season (May to October)				
	yield (tonnes per ha)	feed needed (tonnes)	hectares rainy season	
Sorghum (whole plant)	9.20	15	1.6	
Legumes				
canavalia (whole plant)	17.5	52	2.9	
Yuca (whole plant)	20 **	20	1.0	
King Grass	18 ***	88	4.9	
		<b>174</b>	<b>10</b>	
Grasses		275		
Norgold		20		
TOTAL FEED		<b>469</b>		
** 13 tonnes root, 7 tonnes vegetation				
*** 3 cuts, June, Aug, Oct of 6 T each				

Hectares Allocated to Ration Crops	Planted now	will increase by Dec	TOTAL Acres Ration Crops	Needed For Cows Dry Season Nov-Apr	Needed For Cows Rainy Season May-Oct
sorghum	0.5 *	2	2.0	2.0	1.6
canavalia	1	2	3.0	1.5	2.9
yuca	0	2	2.0	0.0	1.0
sugar cane	16	2	18.0	9.6	0.0
king grass	5	2	7.0	7.3	4.9
			32.0	20.4	10.4
* for seed only					

<b>YUCA</b>	Dec - Sept tonnes/ha/yr Yuca root 12 Yuca straw 8.00
<b>SUGAR CANE</b>	Nov-April tonnes/ha/yr Sugar cane 20
<b>KING GRASS</b>	May-Oct Nov - April tonnes/ha/yr King Grass (irrigated) 18 12 June 6 Aug 6 Oct 6 Jan 6 Apr 6 * cut every 2 months in rainy season and every 3 months in dry season
<b>SORGHUM (carbohydrate)</b>	tonnes per hectare tonnes per hectare Energy kc/kg Protein May-Oct Nov-Apr Sorghum grain (DM) 1.2 1.5 3.2 12 Sorghum straw (DM) 8.00 6 1.8 4.8
<b>LEGUMES</b>	tonnes per hectare tonnes per hectare Energy kc/kg Protein May-Oct Nov-Apr Canavalia grain 2.5 2 2.4 28 straw (DM) 15 10 2.0 16 * lablab purpureos, could also use stizolobium deeringianum
Estimate of Energy and Protein Whole Plant	
<b>SORGHUM</b>	<b>GRAIN</b> <b>FOLIAGE WHOLE PLANT</b>
Rainy Season	
Percent 0.15 0.85	
Energy 3.2 1.8 2.01	
Protein 0.12 0.048 6%	
<b>Dry Season</b>	<b>GRAIN</b> <b>FOLIAGE WHOLE PLANT</b>
Percent 0.25 0.75	
Energy 3.2 1.8 2.15	
Protein 0.12 0.048 7%	

## FEEDING YUCA TO COWS

The new ration formulation includes yuca, viewed as a cash crop at this CPA. Described by some farmers as a “milk bomb”, new plantings of yuca in ration crop rotations will ensure none of the present crop is diverted from the market (State).

To assess the economics of this, we performed a sensitivity analysis on marketing yuca as a root (sold to the State) or marketed through the cows and sold as milk. The mathematical model below (given CPA and ANAP) measures the benefit/cost of feeding a variable quantity of whole yuca (plant mass and root) to cows versus selling the root to the State across multiple price scenarios for milk and yuca. For example, if feeding cows 2 pounds of whole yuca plant otherwise valued .9 pesos per pound results in a 2 litre increase in milk production when milk is valued at 2.7 pesos per litre, feeding yuca to cows creates a benefit of 3.01 pesos over selling it to the state as root.

Aug-11 Benefit (cost) of feeding 2 kg of yuca plant (whole) to cow vs selling 1.2 kg yuca root to Empresa									
KG Whole Yuca per cow per day	Increment in Milk Yield	Yuca Price/lb							
2	2	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4
milk price/lt	2	\$2.14	\$1.88	\$1.61	\$1.35	\$1.08	\$0.81	\$0.55	\$0.28
	2.1	\$2.34	\$2.08	\$1.81	\$1.55	\$1.28	\$1.01	\$0.75	\$0.48
	2.2	\$2.54	\$2.28	\$2.01	\$1.75	\$1.48	\$1.21	\$0.95	\$0.68
	2.3	\$2.74	\$2.48	\$2.21	\$1.95	\$1.68	\$1.41	\$1.15	\$0.88
	2.4	\$2.94	\$2.68	\$2.41	\$2.15	\$1.88	\$1.61	\$1.35	\$1.08
	2.5	\$3.14	\$2.88	\$2.61	\$2.35	\$2.08	\$1.81	\$1.55	\$1.28
	2.6	\$3.34	\$3.08	\$2.81	\$2.55	\$2.28	\$2.01	\$1.75	\$1.48
	2.7	\$3.54	\$3.28	\$3.01	\$2.75	\$2.48	\$2.21	\$1.95	\$1.68
	2.8	\$3.74	\$3.48	\$3.21	\$2.95	\$2.68	\$2.41	\$2.15	\$1.88
	2.9	\$3.94	\$3.68	\$3.41	\$3.15	\$2.88	\$2.61	\$2.35	\$2.08
	3	\$4.14	\$3.88	\$3.61	\$3.35	\$3.08	\$2.81	\$2.55	\$2.28
	3.1	\$4.34	\$4.08	\$3.81	\$3.55	\$3.28	\$3.01	\$2.75	\$2.48
	3.2	\$4.14	\$4.28	\$4.01	\$3.75	\$3.48	\$3.21	\$2.95	\$2.68
	3.3	\$4.14	\$4.48	\$4.21	\$3.95	\$3.68	\$3.41	\$3.15	\$2.88
	3.4	\$4.14	\$4.68	\$4.41	\$4.15	\$3.88	\$3.61	\$3.35	\$3.08
	3.5	\$4.14	\$4.88	\$4.61	\$4.35	\$4.08	\$3.81	\$3.55	\$3.28

The table below reflects costs and benefits for the existing herd over an entire season. In the above example, net benefits to the CPA in feeding 2 kg of yuca (1.2 kg of root) to cows when milk is 2.7 pesos per litre and yuca is .9 pesos per pound is 29,809 pesos.

TOTAL BENEFIT (COST) - RAINY SEASON Benefit (cost) of feeding 2 kg of yuca plant (whole) to 55 cows vs selling 1.2 kg yuca root									
Tonnes Yuca diverted to milk wet season	Increment in Milk Yield	Yuca Price/lb							
19.8		0.7	0.8	0.9	1	1.1	1.2	1.3	1.4
milk price/lt	2	\$21,205	\$18,577	\$15,949	\$13,321	\$10,694	\$8,066	\$5,438	\$2,810
	2.1	\$23,185	\$20,557	\$17,929	\$15,301	\$12,674	\$10,046	\$7,418	\$4,790
	2.2	\$25,165	\$22,537	\$19,909	\$17,281	\$14,654	\$12,026	\$9,398	\$6,770
	2.3	\$27,145	\$24,517	\$21,889	\$19,261	\$16,634	\$14,006	\$11,378	\$8,750
	2.4	\$29,125	\$26,497	\$23,869	\$21,241	\$18,614	\$15,986	\$13,358	\$10,730
	2.5	\$31,105	\$28,477	\$25,849	\$23,221	\$20,594	\$17,966	\$15,338	\$12,710
	2.6	\$33,085	\$30,457	\$27,829	\$25,201	\$22,574	\$19,946	\$17,318	\$14,690
	2.7	\$35,065	\$32,437	\$29,809	\$27,181	\$24,554	\$21,926	\$19,298	\$16,670
	2.8	\$37,045	\$34,417	\$31,789	\$29,161	\$26,534	\$23,906	\$21,278	\$18,650
	2.9	\$39,025	\$36,397	\$33,769	\$31,141	\$28,514	\$25,886	\$23,258	\$20,630
	3	\$41,005	\$38,377	\$35,749	\$33,121	\$30,494	\$27,866	\$25,238	\$22,610
	3.1	\$42,985	\$40,357	\$37,729	\$35,101	\$32,474	\$29,846	\$27,218	\$24,590
	3.2	\$41,005	\$42,337	\$39,709	\$37,081	\$34,454	\$31,826	\$29,198	\$26,570
	3.3	\$41,005	\$44,317	\$41,689	\$39,061	\$36,434	\$33,806	\$31,178	\$28,550
	3.4	\$41,005	\$46,297	\$43,669	\$41,041	\$38,414	\$35,786	\$33,158	\$30,530
	3.5	\$41,005	\$48,277	\$45,649	\$43,021	\$40,394	\$37,766	\$35,138	\$32,510



We were surprised to find an irrigated area set aside for ration crop production had been planted to Moringa trees, a species Cuba's Ministry of Agriculture is currently experimenting with for animal feed. They were planted at a low density appropriate to silvopasture and seed production rather than for more nutritionally-robust forage production.

We encourage the CPA to increase the planting density of these Moringa trees and manage the crop for forage production to replace the ration crop that otherwise would have been grown here. Since harvesting before maturity eliminates seed production, the CPA may wish to designate a small section of the field to grow out trees for continued seed production. Indeed, this area could be adjacent to the feedlot and also produce shade. This could be a strategy for all laneways.

## OTHER OBSERVATIONS ARISING FROM OUR AUGUST VISIT

We note the CPA has not yet implemented night grazing. We realize grazing of cattle at night raises security concerns, but continue to feel this strategy is worth pursuing because it will result in production increases (cattle eat more when cool and shaded, and therefore give more milk). Because this will result in more effective grazing, rotations are important as is ongoing pasture improvement.

Increased attention to the establishment and management of shade trees is needed to protect these small trees from foraging cattle. The past six years have not produced significant added shade because the Nim trees have been stunted or killed outright by unprotected foraging by the pastured cattle. The establishment of Morenga trees must be more intensely managed to prevent premature foraging by the cattle.

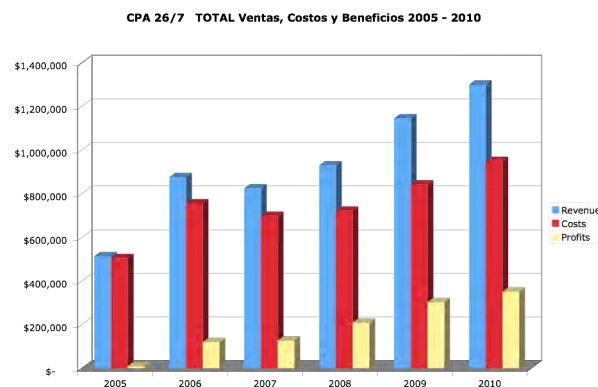
There has been little apparent progress in the development of a "calf ration" other than a blended chopped forage feed. Calves must be feed a high concentration of energy and protein obtained from seed production. This high quality ration is essential when weaning them off milk. Aurelio Alvarez Mendez, IIPF, should be consulted to develop such a high quality calf feed ration with the correct energy:protein balance for young calves. Sorghum seed is a good source of energy, as is corn, and caravali, soyabeans (roasted), peanuts and/or other protein rich seed could be easily ground and mixed together using the proportioner mill provided the CPA for this purpose. Remember: the nutrition the calf gets is what determines her performance as a mature cow. The point is to stop feeding her fresh milk that could be sold to Cubans and instead get her quickly converted to a nutritious ration. The small cost of diverting small quantities of farm-produced sorghum, corn, caravali and soya to produce a high quality calf ration is miniscule in comparison to the benefits. A high quality calf ration would be a very



good example of a robust, on-farm value-added activity. Further, the development of such high quality rations could easily create another micro-industry for the CPA.

We also feel that the CPA has insufficient feed bunk space for the dairy cattle. Each cow should have a minimum of 1.5 to 2 feet of bunk feed access, otherwise the weaker animals will not be able to compete for space and will remain underfed.

## SUMMARY AND CONCLUSIONS



Despite the operational matters raised in this Project Report, we all agree that the CPA 26 Julio has achieved remarkable success in only a few years.

Thanks to the leadership of President Juan Sanchez Martel, a dedicated Junta and very hard-working and skilled members, the CPA's revenue has grown by two and a half times since 2005, and profits have increased by forty fold!

We feel this is truly remarkable progress and must be recognized by all from the outset. After six years of very hard work by the CPA and through the support many individuals and entities, both Canadian and Cuban, who volunteered their time to this Project, CPA 26 Julio now has both the infrastructure and knowledge to make major advances in efficiency and productivity to achieve its full potential on behalf of its members and the community.

As the results of our visit demonstrate, the critical component that needs to be addressed is feed capacity and animal nutrition.

As we have seen, the increase in on-farm feed production over the past 5 years has meant that animals are no longer dying in the dry season, But this also means that the animal population is expanding faster than the CPA's capacity to produce rations. Since 2008, this has resulted in a drop in dairy nutrition and a subsequent drop in milk production.<sup>1</sup>

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NOTE: We understand milk production is also dropping in cattle farms in Camaguey. It is our opinion that this situation reflects the fact that Camaguey is in a dryland farming belt and has experienced two years of continuous drought. We believe the situation at the CPA 26/7 is the result of different factors and, as described above, is remediable

## RECOMMENDATIONS

To achieve its potential, the CPA needs to expand ration crop production and implement the recommended feeding program to improve overall nutrition but in particular dairy herd nutrition, including calves. Once a balance is reached between animal numbers and feed capacity, the CPA needs to monitor these more closely to ensure this balance is maintained.

While the work of many CPA members is in some way related to feed (producing it, harvesting it, chopping it, feeding it, managing animals that depend on it) there is no-one oactually in charge of over-seeing the feed requirements for all the animals and ensuring that they are met. Because this person needs to work at the strategic planning level (planting decisions), we believe creating such a position at the level of the Junta would be appropriate. This we feel would improve feed production capacity and animal nutrition, thereby improving the economic and social performance of this cooperative.

Cuba is now embarking on a deepening and widening of cooperatives as an economic and social engine. Agriculture will be the first to walk the walk of more cooperative engagement. Where appropriate, this will include formation of tier two cooperatives. The CPA 26 Julio will almost certainly be one of the leaders on this new path. As such, they should be given all the resources, support and encouragement they need to achieve their cooperative potential and help others achieve theirs.