THE EFFECTIVE PRODUCTION COST OF CACAO: PERFORMANCE OF THREE FARMS IN THE1998-99 SEASON.

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This paper considers the agricultural activity of cacao production in Southern Bahia, Brazil. The work refers to the *production technology* by means of *technological coefficients,* to the private evaluation of production process by the use of suitable indicators.

The production process of three chosen farms was monitored during the season 1998-99(May-Apr), in the context of the UESC's (Universidade Estadual de Santa Cruz) "Cacao Effective Production Cost" research project.

Average Variable Cost for the three farms in the entire agricultural year (R$.May.1998) was **R$.18.97/@ (@=arroba=15 kg), R$.23.74/@** and **R$.12.07/@,** respectively, for the farms number 1, 2 and 3. Considering the two half of the agricultural year, these costs were for the same three farms: "***Temporã"Crop(*** May/Oct-1998): **R$.13.31/@, R$.14.47/@** and **R$.12.29;** and ***Principal Crop*** (Nov-1998/Apr-1999): **R$.52.15/@, R$.35.92/@** and **R$.11.74/@**. Product price during the period varied from **R$.18.00/@** to **R$.33.00.** As a matter of fact, the producer can afford the variable cost of production, except the farms 1 and 2 in the Principal Crop.

The difficulty arises when the *Fixed Cost* is considered . It were established seven scenarios of fixed cost and when they are taken into account the farms realize that they are in long run disequilibrium.

The *private profitability* , *break-even point* and productivity of labor were estimated.

Technology is approached by *input/input technical coefficients* and *input/output technical coefficients.*

Key – word : Private Economic Evaluation; Production Technical Coefficients.

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I – Introduction

Since 1998-1999 season (MAY/APR), Department of Economics of UESC-Universidade Estadual de Santa Cruz, at Ilhéus, Bahia, Brazil, is monitoring cacao production cost in three farm in Southern Bahia. The work is being done by the "*Effective Cacao Production Cost Project"* . This paper presents some data and

conclusions of the first year of execution, comprising profitability, velocity of capital rotation , labor productivity, break-even point, as indicators of economic evaluation. It's presented *input/output production's technical coefficients* as a manner to approach technology. Physical production, which is decisive about costs, is also presented. Are also information about price received by producer.

II - Material And Methods

Here the farms are numbered from one to three . One is property of UESC and the others private.

Cause there is only one year of observations and a few farms, the work deals with *Cost Equations*, i.e., costs formed by *inputs quantity* and *price* and not with *Cost Functions,* costs in function of *quantity produced* **(HENDERSON & QUANDT, 1971)**

Quantitative data (product and input prices and quantities) are collected weekly or fortnightly directly form the farms. Variable costs sheets embraces physical quantities used of each input (either labor or material) by the farm during the season and their financial value estimated by their prices. Fixed costs sheets includes depreciation of physical asset, interest upon the same asset and maintenance amount at the rate of 2.5% upon the value of asset. Because there is a lot of controversy about the setting of fixed costs sheets, it was done seven fixed costs' scenarios for each farm. Attached there are some of those sheets in portuguese language. Moreover, there are two values for each scenario of fixed costs. One, when it is considered the *current market value* of the asset cacao plantations. The other, when it is taken the *value of implantation* of the same areas. Certainly, nowadays the latter is greater than the former. So that, there is fourteen values for *Total Average Cost (TAC),* to be compared with the market price of the product, the cacao. As there are three time division – the *whole*

season, the *temporã crop* and the *principal crop* – it is possible to number forty two (14 x 3) estimates for TAC.

As estimators of economic evaluation it was taken (see **HOLANDA, W/D)**: *Profitability,* microeconomic and private indicator expressed by

$$P^* = P/K$$

where, P* = profitability; P = profit; K=capital.

Velocity of capital rotation, macroeconomic and social indicator defined by:

$$VKR = GVP/K$$

where VKR = velocity of capital rotation; GVP = gross value of production; K = capital.

The inverse of VKR is the payback period (PP), which shows in how many years the capital is recovered.

Labor Productivity, which is :

$$LP = GVP/L$$

Where, LP = labor productivity; GVP = gross value of production, L = labor, expressed by *Equivalent – man,* the work of a man during 300 days.

Break-even point , defined as:

BEP = TFC / (p – VAC)

Where, BEP = Break-even point, TFC = total fixed cost, p = price of cacao, VAC = variable average cost.

Technology is approached by the presentation of the first *production technological coefficients.* These coefficients, ratios between quantities of inputs and outputs or between inputs and inputs, characterize the production process, its technology, the production efficiency and, certainly, remotely, the resource allocation. The coefficients may be *input/output* or *input/input* (generally relating to *one hectare* of the husbandry). Initially the technical coefficients will be accumulated and in the future be approached as randomic variables. Thus, it will be avoided the defects pointed by **CONWAY & BAY (1988).**

III - Results

As a matter of fact, the three farms had poor agronomic performances: cacao productivity or yield, for the whole season, holds 9.01, 21.12 and 11,33 @/ha (@=arroba=15 kg; ha=hectare). In recent past this parameter was, as a regional average, 40 or 50 @/ha. The most efficient farms got 100 @/ha. Table 1 shows the performance of the studied farms.

Table 1 – Production(Prod.) and productivity(P-y) . (Area: ha; Prod:@; P-ty: @/ha)

Farm.	Área Caca	Temporã crop		Principal crop		1998-1999 season	
		Prod.	P-ty	Prod.	P-.y	Prod.	P-y
1	127,87	984	7,69	168	1,31	1.152	9,01
2	76,69	922	12,02	698	9,10	1.620	21,12
3	34,25	236	6,89	152	4,43	388	11,33

These poor results are product of defined technologies presented below by means of production technical coefficients and certainly reflect the amount invested in the production processes.

Cause the difficulties experienced by the regional agriculture, the studied farms did a few investment in variable factors, how it is showed in the Table 2.

Table 2.: TOTAL VARIABLE COSTS-TVC (BY HECTARE), AVERAGE VARIABLE COSTS-AVC (BY PRODUCED @) AND TOTAL EXPESES –TE- BY FARMS – SEASON 1998-99 (IN R$ DE MAI-1998), TEMPORÃ AND PRINCIPAL CROPS.

FARM (HA)	TVC (R$/HA)			AVC (R$/@)			TOTAL EXPENSES(R$)		
	Temp.	Princ.	Season	Temp.	Princ.	Season	Temp.	Princ.	Season
1 (127,87)	102,39	68,52	170,90	13,31	52,15	18,97	13.092,16	8.761,06	21.853,23
2 (76,69)	173,97	327,52	501,57	14,47	35,98	23,74	12.768,91	25.117,38	37.892,38
3 (34,25)	84,67	52,09	136,76	12,29	11,74	12,07	2.900,02	1.784,12	4.684,14

Farm 2 was the more expansive and Farm 3 the less. Because there is no references, only a little would be said about the relations among production, productivity and expenses.

To the complete season the profitability has a behavior as described by Table 3.

Table 3 . Profitability . Season 1998/99 – Values in R$.de.MAI.1998-
Taken two scenarios of TFC: **the greatest** (cacao by **implantation**- TFC **complete)** and **the less** (cacao by **market** e TFC **only maintenance**)

Farm Scenar.	GVP	TVC	TFC	TC	FK	VK	TK	P-y
1-Great.	10.046,00	21.853,23	147.272,00	169.125,23	913.602,52	21.853,23	935.455,75	-0,17= -17%
1- Less	10.046,00	21.853,23	19.149,02	41.002,25	451.096,52	21.853,23	472.949,75	-0,06= - 6%
2Great.	43.629,10	37.892,38	113.395,74	151.288,12	509.905,74	37.892,38	547.798,12	-0,20= - 20
2-Less	43.629,10	37.892,38	10.158,46	48.050,84	241.175,74	37.892,38	279.068,12	-0,02= - 2%
3-Great.	9.908,32	4.684,14	61.096,60	65.780,74	242.437,63	4.684,14	247.121,77	-0,23= -23%
3-Less	9.908,32	4.684,14	13.960,66	18.644,80	117.425,13	4.684,14	122.109,27	-0,07= - 7%

In the Table 3 there are only the following new symbols: TC-Total Costs; FK-Fixed Capital; VK-Variable Capital; TK-Total Capital.

So, there is no favorable scenario. In the best situation the business got a negative profitability of –2%.

Velocity of capital rotation(VKR) and payback period (PP) are presented in Table 4.

Table 4 – Season-1998/99 – Velocity of capital rotation(VKR)
and Payback Period (PP) - R$.MAI-1998 –
For two scenarios: the greatest and the less TFC

Farm Scenar.	GVP	TK	VKR	PP
1-Great.	10.046,00	935.455,75	0,01	100
1- Less	10.046,00	472.949,75	0,02	50
2-Great.	43.629,10	547.798,12	0,08	12,5
2-Less	43.629,10	279.068,12	0,16	6,25
3-Great.	9.908,32	247.121,77	0,04	25
3-Less	9.908,32	122.109,27	0,08	12,5

By these indicators Farm 1 is the more inefficient. At each season the produced value is only 1% of the total capital, in the more expansive scenario. So, if here were no costs, the firm would spend 100 years to recover the capital. The best situation is of

Farm 2, of course in scenario of the less TFC: each year would recover 16% of capital and in the run of 6,25 years the capital would be recovered.

Table 5 shows the productivity of the labor for the three farms.

Table 5 - Season 1998/99 – Labor Productivity (LP)

GVP (R$MAI98)	LABOR (JOURNEYS)	EQUIVALENT MAN (E. M.)	EXPENSES WITH LABOR (R$MAI98)	LP (R$/E.H.)	LP (R$/R$) (unit.)	FARMS
10.046,00	**4.150**	**13,83**	**19.687,41**	**726,39**	**0,51**	**1**
43.629,10	**? empreitada**		**24.856,32**		**1,75**	**2**
9.908,32	**708,1**	**2,36**	**3.315,93**	**4.198,44**	**2,99**	**3**

The table shows how much an equivalent – man produces, or, in others words, how much a man working all the year produces. In the Farm 1, he produces only R$.726,39/year, in constant money of MAY-1998. This man, on the other hand, success recover only 51% of the expenses made with him. In Farm 3 the performance is better, with these values equal to, respectively, R$.4.198,44 and 299%. The Farm 2, by information lacks, has it results prejudiced. Only for comparison, **PINDYCK & RUBINFELD (1998)** present the values of this indicator for some countries in US$/worker: France-21,529.00; Germany-22,373.00; Japan-21,269.00; United Kingdom-19,925.00; United States of America-26,183.00.

It was established the Break-even point (BEP) for the three farms. Table 6, below, exhibits the values of this indicator. The values are extremely high. Farm 3, the best (or the less worse) by this criterion, would achieve this condition when accomplishes produce 4,492.40 @ or 1,026.52 @, according to the TFC. Really, in this season Farm 3 produces only 388 @. Farm 2 needs produce 27,390.27 @ or 2,453.73 @ and did only 1,620.00. Farm 1 needs produce 14,683.15 @ or 1,909.17@ and succeed to produce only 1,152.00 @.

Table 6 - Season – 1998/99 – Break-even point (BEP)

Taken two scenarios of TFC: **the greatest** (cacao trees by **implantation**- TFC **complete)** and **the less** (cacao trees by **market** and TFC **only maintenance**

FARM AND SCENARIO	TFC (R$)	CACAO PRICES(R$/@)	AVC (R$/@)	BEP(@)
1 – Greatest 1 – Less	147.272,00 19.149,02	29,00	18,97	14.683,15 1.909,17
2 – Greatest 2 – Less	113.395,74 10.158,46	27,88	23,74	27.390,27 2.453,73
3 – Greatest 3 – Less	61.096,60 13.960,66	25,67	12,07	4.492,40 1.026,52

A first approach of technology is done by Table 7, which shows input / output production technical coefficients. They may be studied only when exist enough observations.

Table 7 - Season 1998/99 – Some Input / Output Production Technical Coefficients – Labor and Material - For Temporã crop, Principal crop and the whole Season.

	FARM.1			FARM.2			FARM . 3.		
PRACTICES	TEMP	PRIN	SEAS	TEMP	PRINC	SEAS	TEMP	PRINC	SEAS.
1.LABOR (man-day/@)									
Clearing	1,23	2,64	1,43	0,00	0,03	0,01	0,36	0,18	0,29
Phyt.Prunning	0,22	2,33	0,52	0,23	1,96	0,97	0,71	0,55	0,65
Remove bud	0,07	0,00	0,06	0,07	0,001	0,04	---	--	--
Basic.Manuring	0,00	0,14	0,02	0,001	0,00	0,001	---	--	--
Harvest	1,19	0,00	0,16	0,41	0,21	0,32	0,52	0,60	0,55
2.MATERIAL									
Insecticide (Parathion kg/@))	-	-	-	0,024	0,179	0,091	-	-	-
(Malatol-kg/@)	-	-	-	-	-	-	0,64	?	?
Fungicide (copper-kg/@)	-	-	-	0,13	0,00	0,07	-	-	-
Diesel (l/@)	-	-	-	-	-	-	0,58	0,00	0,35
Gas (l/@)	-	-	-	-	-	-	0,92	?	?

A first survey of price received by cacao agriculturist is in the Table 8. Any future study of this important variable will depend of existence of variability, i..e., more

data. This affair will be get by either more observed farms or more observation time of the same number of farms.

Table 8 – Cacao Received Prices - Season 1998/1999

MONTH	FARM.1		FARM.2		FARM.3		PRICE INDEX
	CURREN PRICE- (R$/@)	CONST. PRICE (R$MAI 98/ @)	CURREN PRICE (R$/@)	CONST. PRICE (R$MAI 98/ @)	CURREN PRICE- (R$/@)	CONST. PRICE (R$MAI 98/ @)	IGP-DI-FGV
MAY-98	-x-	-x-	29,90	29,90	-x-	-x-	146.544
JUN-98	-x-	-x-	26,10	26,02	-x-	-x-	146,951
JUL-98	-x-	-x-	-x-	-x-	26,00	26,02	146,398
AUG-98	-x-	-x-	26,00	26,07	24,50	24,57	146,144
SEP-98	-x-	-x-	-x-	-x-	-x-	-x-	146,111
OCT-98	-x-	-x-	25,20	25,28	25,00	25,08	146,063
NOV-98	-x-	-x-	25,50	25.63	25,00	25,13	145,797
DEC-98	-x-	-x-	25,25	25,13	23,50	23,39	147,231
JAN-99	-x-	-x-	-x-	-x-	30,00	29,52	148,921
FEB-99	-x-	-x-	40,00	37,69	-x-	-x-	155,528
MAR-99	33,00	30,49	-x-	-x-	-x-	-x-	158,600
APR-99	28,00	25,86	-x-	-x-	-x-	-x-	158,647
APR-99	26,00	24,02	-x-	-x-	-x-	-x-	158,647

IV – Discussion

It is presented descriptive economic study of the cacao production process in three farms in Southern Bahia. Evaluating this agribusiness by indicators of the typical year kind, which didn't considers the time dimension of the activity, it is clear that agricultural cacao

production business is in very difficulty situation. All evaluator coefficients point this fact.

Nevertheless the best studies of the material of that research may be done only when exist enough information, accumulated longitudinally along the years in time series or alternatively or even simultaneously in spatial series obtained from a

sufficiently big number of observed farms, some important inferences may be done. Probably the most important of them is that there is a not functional relation between used technology or management and the results. The results is bad, poor. So, it is needed to search technology and administration practices that improve the results. This is the great challenge ahead. Mainly systematize the actions for research and management.

The research project whose results are here presented must be expanded to a *research program in Production Economics,* since exist support for that.

It is established seven scenarios for fixed cost, because that is a controversial affair. For example, **MATSUNAGA et al. (1976)** created the *Operational Costs,* avoiding the difficulties of employment of *Fixed Cost.* **FERREIRA (1996)** didn't accept such solution, but **MARTIN et al. (1994)** did.

Sure, only when this project achieve the status of ripe the best use of information will be done, resulting in use of more sophisticated instruments and in better support to agriculture. Only then it will be possible to use *cost functions, production functions* and the marginalist apparatus to do inference about the activity. Certainly in order to do that, the project must to establish a sample of the productive sector.

Certainly when mature the project will have the possibility of doing works like the done by, v.g., **DALEN & GOMEZ-LOBO (1997)**, estimating cost functions in the context of asymmetric information; **BALK (1997),** who got canonical form to cost function. Perhaps it may get profit from works like **LENCE & MILLER (1998),** which studied method for to know the share of specific activity in inputs used by multiproduct firms.

V – Bibliography

1.CONWAY, P.J. & BAY, F.M. (1988) **–** "Approximating effective protection coefficient without reference to technological data"-***World Bank Economic Review-*** 2 (3): 349-363.

2.BALK, B.M. (1997) – "The decomposition of cost efficiency and the canonical form of cost function and cost share equation" – ***Economics Letters*** - 55(1997): 45-51.

3.DALEN, D. M. & GOMEZ-LOBO, A. (1997) – "Estimating cost function in regulated industries characterized by asymmetric information" – ***European Economic Review*** **–** 41 (1997) : 935 – 942.

4.FERREIRA, H. I. S. (1996) – "Custo de produção agrícola: em busca de um construto" - ***Agrotrópica*** - Ilhéus, Bahia, Brasil - 8(2): 71-82.

5.HENDERSON, J. M. & QUANDT, R. E. (1971**) - *Microeconomic theory – A mathematical approach"* –** Tokyo/– McGraw-Hill/ Kogakusha - 431 p.

6. HOLANDA, N. (W/D) – ***"Elaboração e avaliação de projetos"*** – Rio de Janeiro – APEC – 206 p.

7.LENCES.H. & MILLER, D.J. (1998) – "Recovering out-put-specific inputs from aggregate input data: a generalized cross-entropy approach." – ***American Journal of Agricultural Economics*** **–** 80(4): 852-67 – NOV-1998.

8.MARTIN, N.B.; SERRA, R.; ANTUNES, J.F.G.; OLIVEIRA, M.D.M. & OKAVA, H. (1994) – "Custos: Sistema de custos de produção agrícola" – ***Informações Econômicas*** – São Paulo: 24(9): 97-122 – SET-1994

9.MATSUNAGA, M.; BEMELMANS, P.F.; TOLEDO, P.E.N.; DULLEY, R.D.; OKAWA, H. & PEROSO, I.A. (1976) – "Metodologia de custo de produção utilizada pelo IEA" – in: ***Seminário Internacional sobre Custos de Produção na Agricultura –***

São Paulo – 1976 – Anais – Secretaria de Agricultura de São Paulo – Instituto de Economia Agrícola – IEA.

10. PINDYCK, R. S. & RUBINFELD, D. L. (1998) – ***"Microeconomics"-*** 4th edition – Upper Saddle River, USA - Prentice Hall –726 p.