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ANNOUCEMENTS, COMMENTS AND NOTES

ANNOUNCEMENT

THE S.J.J. DE SWARDT AGREKON PRIZE

The S.J.J. de Swardt Agrekon Prize for 1985 has been awarded jointly to prof. W.L. Nieuwoudt and prof. J.A. Groenewald. The prize-money of R700,00 will be shared by the authors. Prof. Nieuwoudt receives the prize for his article, "An economic analysis of demand and policies in the beef industry" which appeared in the October 1985 issue of Agrekon and prof. Groenewald for his article, "South African agriculture and inflation phenomena" published in the April 1985 issue of Agrekon. It may be mentioned that the judges indicated unanimously that the standard of the articles submitted was exceptionally high and that the task of adjudication was difficult.

The S.J.J. de Swardt Agrekon Prize owes its foundation in 1962 to Mr S.J.J. de Swardt, former Secretary for Agricultural Economics and Marketing, who made a bequest to the Department for the award of prizes for meritorius contributions in the field of agricultural economics published in Agrekon.

There were no candidates for the award of the Agrekon Prize for the best debutant article for 1985.

COMMENT

AN ECONOMIC EVALUATION OF SOME CROP SUCCESSION SYSTEMS:

Comment by
J. van Zyl, University of Pretoria

In a recent article Blignaut, De Jager, Human & Grobbelaar (1986) showed the long wheat fallow system to be the most economic of six rotational and fallow systems evaluated under dryland conditions in the Free State Midlands for a period of 24 years (1960-1983). The different systems, namely wheat and maize monoculture, long fallow wheat, wheat-wheat-long fallow, wheat-maize crop rotation and wheat-wheat-maize crop rotation, were evaluated for a hypothetical farming unit of 600 ha arable land in respect of gross farm production value, margin above variable costs, net farm income and farm profit. This was done for the period at 1983 prices, as well as in respect of the annual farm profit figures, purchasing power and financial risk. It was concluded that crop choices based mainly on gross margins are laden with potential dangers.

In the opinion of this author, the approach followed by Blignaut et. al. (1986) is interesting, informative and a step forward. It is also a contribution in a field where economic analysis has until recently been relatively neglected, and where used, too static. However, the results must be interpreted with care and generalizations must be guarded against. In this comment attention is given to two aspects that might throw light on the findings of Blignaut et. al. (1986): Some thoughts on gross margins as selection criterion for production recommendations are firstly discussed, whereafter the most economic crop succession system receives some attention.

Production recommendations can be based mainly on gross margins without any potential dangers, provided that the basic characteristics of gross margins are thoroughly taken into account and provided that such usage does not run counter to the fundamental economic principles. Gross margin consists of gross production value minus variable costs (Division of Agricultural Production Economics, 1984) and thus does not provide for fixed costs and payment for external capital. If fixed costs and payment for external capital are similar for different enterprise combinations, then gross margin is particularly suitable as selection criterion.

Over the short term (for example one or two years) certain items such as labour and machinery are given and thus represent fixed costs in the economic sense. Over the longer term such items are however also variable and should thus be included in the calculation of gross margins. Most costs are variable over a period of 24 years and gross margin and farming profit should thus be the same. The point is that the composition of variable cost must differ between the longer and shorter term to avoid serious mistakes. By definition the labour and machinery requirements of the different crop succession systems differ (Grobbelaar, 1985). If different farm operations (or the same farm operation with different machinery systems) are thus compared over the short term, gross margin is by definition not suitable because fixed costs differ. Over the long term labour and machinery requirements are however variable, and long-term gross margins can, in contrast with short-term gross margins, be used for comparison of production decisions.

According to Blignaut et. al. (1986) it appears that the long wheat fallow system is the most economic of the six crop succession systems which were evaluated. This evaluation however took place within the framework of certain assumptions, and a variation of these assumptions can lead to the selection of other crop succession systems. The optimum output combination between products are

for example obtained where (Boehlje & Eidman, 1984: 202-206):

$$PY_1/PY_2 = \Delta Y_2/ \Delta Y_1 \ldots (1)$$

with PY_1 = price of product Y_1;

with PY_2 = price of product Y_2;

ΔY_1 = change in quantity produced of product Y_1 due to substitution by product Y_2; and

ΔY_2 = change in quantity produced of product Y_2 due to substition by product Y_1.

It appears from Equation 1 that the product price ratio plays a decisive role in the determination of the optimum output combination. This is also the case with the selection of crop succession systems. Table 1 shows wheat and maize prices, as well as the percentage price ratio of wheat to maize, since 1960.

From Table 1 it appears that wheat prices exceeded maize prices on average by 82,7% per annum in the 24 year period 1960-1983. In only one year, namely in 1983, wheat prices exceeded maize prices by less than 60%. Since 1983 this percentage has however declined to less than 50% in 1984 and 1985. With the relatively favourable product price ratio with respect to maize in 1983, the wheat-maize crop rotation accordingly shows a larger farming profit than the long fallow wheat system with mean yields for the period 1960-1983 at 1983 prices (Blignaut et. al., 1986: 42 - Table 1). With the relatively more favourable maize price ratios of 1984 and 1985 crop succession systems incorporating

maize would thus have fared better relative to other systems. Faster input price increases relative to output prices will however favour crop succession systems that require fewer inputs.

From the above it can be deduced that, given price ratios such as encountered in 1984 and 1985, the wheat-maize crop rotation yields the highest farming profit and total purchasing power. Price movements should thus receive more attention. What was true for 1960-1983 is not necessarily true in 1984-1990. Especially now that there is a possibility that some wheat cultivars, especially those cultivated under dryland conditions in the summer rainfall area, may be marketed as feed grain in surplus years.

At 1984 and 1985 product price ratios the long fallow wheat system yields a lower mean annual farming profit and total purchasing power than a wheat-maize rotation system, but the farming profit is more stable. Given this situation, risk decision-making can be used to determine the optimum crop succession system (Van Zyl & Groenewald, 1986a: 1-9). In a recent study Van Zyl & Groenewald (1986b: 17-19) show that a farmer with liquidity problems should follow a more conservative strategy; in this case therefore the merit of the long fallow wheat system increases relatively to those of other systems. However, if a farmer is financially sound he should rather adopt the strategy with the highest short-term profit potential, namely the maize-wheat rotation system.

Varying product price ratios, also relatively to costs, and differing machinery and labour requirements of the different crop succession systems, complicate the selection of the optimum system considerably. Relative price ratios vary over the short term, but machinery and labour are fixed, and can only be varied over the long term. This consideration increases the attractiveness of a flexible system that can adapt more easily to a varying price and production milieu (Louw, 1975). This can result in a long-term optimum consisting of varying long fallow wheat and wheat-maize rotation in each year within restrictions as laid down by machinery and labour.

In summary it can be said that gross margin can without any danger, be used for production recommendations, provided that the basic characteristics thereof and the principles of production economics are thoroughly taken into account. Price ratios influence production decisions and also optimum crop succession systems. Price ratios as encountered in 1983 to 1985 favour the wheat-maize rotation system relatively to the long fallow wheat system, but are also more risky. Risk decision analyses are necessary to select the best system under varying conditions. Liquidity considerations and flexibility become important criteria. The results obtained by Blignaut et. al. (1986) should therefore be interpreted within the framework of the restrictions to which they are subjected. Changes in factors such as price ratios, yields (size and riskiness) and cultivation practices may lead to the selection of a different crop rotation system.

TABLE 1 - Wheat prices, maize prices and the percentage price ratio of wheat to maize, 1960-1985

Year	Wheat prices*	Maize prices**	Percentage price ratio of wheat to maize
	(R/t)	(R/t)	
1960	56,44	31,39	179,8
1961	56,82	30,31	187,5
1962	56,16	27,44	204,7
1963	56,60	28,75	196,8
1964	59,58	30,26	196,9
1965	59,58	31,75	187,6
1966	62,66	35,65	175,8
1967	65,86	33,23	198,2
1968	65,75	33,40	196,9
1969	65,75	36,36	180,8
1970	66,52	35,26	188,7
1971	69,00	37,37	184,6
1972	66,31	40,10	165,4
1973	75,48	45,50	165,9
1974	95,60	57,00	167,7
1975	102,74	62,00	165,7
1976	117,94	65,00	181,4
1977	117,94	73,60	160,2
1978	132,09	79,95	165,2
1979	179,44	100,00	179,4
1980	208,54	115,00	181,3
1981	233,16	115,00	202,7
1982	285,75	134,05	213,2
1983	265,75	167,55	158,6
Average 1960-1983	109,73	60,05	182,7
1984	289,03	214,60	134,6
1985	312,25	214,65	145,5

*Net B1 producer price

**Net yellow producer price; 1959/1960 taken as 1960, etc.

Source: Abstract of Agricultural Statistics (Directorate of Agricultural Economic Trends, 1986)

BIBLIOGRAPHY

BLIGNAUT, C.S., DE JAGER, J.M., HUMAN, J.J. & GROBBELAAR, J.A. (1986). An economic evaluation of some crop succession systems under dryland conditions in the Free State Midlands. *Agrekon* 25(1): 41-44

BOEHLJE, M.D. & EIDMAN, V.R. (1984). *Farm Management.* John Wiley & Sons, New York

DIRECTORATE AGRICULTURAL ECONOMIC TRENDS (1986). *Abstract of Agricultural Statistics.* Directorate of Agricultural Economic Trends, Pretoria

DIVISION AGRICULTURAL PRODUCTION ECONOMICS (1984). *Agricultural Economic Definitions.* Directorate Agricultural Production Economics, Department of Agriculture and Water Supply, Pretoria

GROBBELAAR, J.A. (1985). *'n Ekonomiese evaluasie van sommige gewasopvolgingstelsels in die Middel-Vrystaat.* Unpublished M.Sc.(Agric.) dissertation, UOFS, Bloemfontein

LOUW, A. (1975). *Beesvleisproduksiestelsel in die Noordwes-Transvaalse Bosveld.* Unpublished M.Sc.(Agric.) dissertation, University of Pretoria

VAN ZYL, J. & GROENEWALD, J.A. (1986a). A comparison of certain decision-making techniques under risk - An empirical investigation of maize cultivar selection. *Agrekon* 25(1): 1-9

VAN ZYL, J. & GROENEWALD, J.A. (1986b). Economically optimal maize cultivar selection under conditions of risk. *Agrekon* 25(1): 10-20