

## THE ECONOMICS OF AVOCADO PRODUCTION IN THE TZANEEN AREA

JC TOERIEN, N MEYER AND DL MILNE  
WESTFALIA ESTATE, DUIWELSKLOOF

### OPSOMMING

*Produksie van avokadovrugte in die Tzaneen-omgewing, gebaseer op ekstensiewe, intermediare of intensiewe kapitaal-investering was vergelyk mbt produksiekostes per ha, produksie in ton per ha, profyt en kontantvloeï voor belasting en rente en die interne koers van inkomste gebaseer op kontantvloeï na belasting.*

*Ontledings dui die volgende rentekoerse aan na belasting:*

*Ekstensiewe investering 6%, Intermediare investering 13% en Intensiewe investering 21%.*

*Hoe meer intensief die kapitale investering is, hoe hoër is die verwagte koers van inkomste. Op grond van hierdie gegewens lyk dit asof 'n ekstensiewe stelsel nie vir avokadoproduksie aan te beveel is me.*

### SUMMARY

*Production of avocados in the Tzaneen area, based on extensive, intermediate or intensive capital investment, was compared with respect to production costs/ha, production in ton/ha, profit and cash flow before taxation and interest and the internal rate of return based on discounted cash flow after taxation.*

*The analysis showed the following internal rates of interest on investment:*

*Extensive investment 6%, Intermediate investment 13% and Intensive investment 21%.*

*The more intensive the capital investment, the higher the percentage return that can be expected. On these grounds it appears that capital investment on an extensive basis would not be a sound policy for avocado production.*

### INTRODUCTION

Production and costs will vary according to climate, management, topography soil characteristics and water availability. This analysis of the economics of avocado production is based on conditions and prevailing management practices in the Tzaneen area. Overhead costs have also been included in production costs.

### CAPITAL INVESTMENT

Normally it depends on the producers confidence in his own abilities and in the avocado market, as to his decision on the intensity of capital investment in avocados.

However, the capital investment pre-determines the production potential of the avocado orchard, while management skill determines the degree to which this potential will be achieved.

**TABLE 1. Establishment costs of avocado orchards.**

	R/ha		
	Extensive	Intermediate	Intensive
Land Value	1 000	1 000	1 000
Destumping and land clearing	350	750	1 800
Cultivation	50	50	300
Fertilization	100	250	450
Irrigation	500	1 000	2 000
Trees and Establishment	850	900	900
<b>Subtotal</b>	<b>2 850</b>	<b>3 950</b>	<b>6 450</b>
Housing: Management	400	400	400
Labour	1 925	1 925	875
Tractor	400	400	400
Implements	150	150	150
Vehicles	400	400	400
<b>Total Establishment costs</b>	<b>R6 125</b>	<b>R7 225</b>	<b>R8 675</b>

**TABLE 2. Production costs of mature avocado orchards (7 years +)**

Running costs	Cost in Rand/ha		
	Extensive	Intermediate	Intensive
Cultivation	320	320	320
Fertilization	90	90	90
Irrigation	200	200	125
Irrigation maintenance	100	100	40
Pruning	70	70	70
Blackspot	450	450	450
Root rot control	200	200	200
<b>Total R/ha</b>	<b>1 430</b>	<b>1 430</b>	<b>1 295</b>
<b>Overhead costs</b>			
Management	270	270	270
Research	0	140	140
Admin + Services	0	540	540
<b>Total R/ha</b>	<b>R270</b>	<b>R950</b>	<b>R950</b>
<b>Total Production costs</b>			
Running cost	1 430	1 430	1 295
Overheads	270	950	950
<b>TOTAL</b>	<b>R1 700</b>	<b>R2 380</b>	<b>R2 245</b>

**TABLE 3. Production costs of avocado fruit relative to age of trees.**

	R/ha		
	Extensive	Intermediate	Intensive
Year 1	840	1 520	1 420
Year 2	850	1 530	1 430
Year 3	1 060	1 740	1 540
Year 4	1 220	1 900	1 665
Year 5	1 330	2 010	1 875
Year 6	1 480	2 160	2 025
Year 7 +	1 700	2 380	2 245

## Marketing costs per ton of avocado fruit

Marketing cost include expenditure of picking, packing and transportation to port or airport, and the

**TABLE 4. Picking and packing costs of avocado fruit**

	Cost in Rand/ton		
	Export	Local	Undergrade
Picking costs	32,75	32,75	32,75
Packing and Handling	15,00	15,00	15,00
Packing Material	102,50	96,50	—
Palletizing	12,25	12,25	—
<b>TOTAL</b>	<b>R162,50</b>	<b>R156,50</b>	<b>R47,75</b>

**TABLE 5. Costs ex packhouse in R/ton.**

Costs	Export		
	Sea freight	Air freight	Local
Inland transport	111,75	42,25	81,00
Sea/air-freight	245,50	558,50	—
Agents port/airport costs	100,50	21,00	—
SAAGA levy	25,00	25,00	5,00
Other	3,25	3,25	—
<b>TOTAL (R/TON)</b>	<b>R486,00</b>	<b>R653,00</b>	<b>R86,00</b>

**TABLE 6. Total marketing costs of avocado fruit in R/ton**

Costs	Export			
	Sea	Air	Local	Undergrade
Picking and packing	162,50	162,50	156,50	47,75
Costs ex packhouse	486,00	653,00	86,00	0
<b>Total cost</b>	<b>R648,50</b>	<b>R815,50</b>	<b>R242,50</b>	<b>R47,75</b>

### Income in rand/ton of avocados on the tree.

Based on a lull marketing season of 26 weeks with Fuerte, Edranol, Mass and Ryan, the price per ton given below can be taken as a norm. Prices vary according to market conditions, count-structure and condition of fruit on arrival.

**TABLE 7. Net value of avocados on the tree in R/ton.**

	Export		Local Market	Under Grade
	Sea	Air		
Gross value	1 245,00	1 370,00	430,00	247,00
Less marketing costs	648,50	815,50	242,50	47,75
<b>Net value R/ton on tree</b>	<b>596,50</b>	<b>554,50</b>	<b>187,50</b>	<b>199,25</b>

Based on an export percentage of 86,5% the net, value of an average ton of avocados is R482/ton on the tree. This value of R482/ton net, compares with values varying between R480 to R540 over the past 5 years. Thus the real value/ton has decreased. This is mainly ascribed to:

1. The increase in cost of packing material.
2. Increased handling and transportation cost.

## Production in Ton/ha

The expected production of avocados is proportional to the potential created at the time of establishments, which is correlated to the capital investments. Management procedures play a major role in the extent to which the producers succeeds in achieving the full production potential of any orchard.

TABLE 8. Expected production of avocados in ton/ha\*\*.

Year	Extensive*	Intermediate	Intensive
2	0	0	0
3	0	0	2,9
4	0,8	2,1	7,1
5	1,6	3,9	11,3
6	4,0	5,8	15,4
7	6,0	7,6	19,6
8	7,5	9,4	19,6
9	8,8	11,2	19,6
10	9,6	13,0	19,6
11	11,0	16,0	19,6
12	10,4	18,0	19,6
13	8,0	18,0	19,6
14	6,3	18,0	19,6
15	3,5	18,0	19,6
16	0	18,0	19,6
17	0	18,0	19,6
18	0	18,0	19,6
19	0	18,0	19,6
20	0	18,0	19,6

\* Based on publication on Dept Agriculture. Jun 1981.

\*\* With a net income of R482/ton.

TABLE 9. Influence of orchard condition of mature avocado orchards on yields (ton/ha), according to orchard rating for the severity of root rot.

Orchard rating	0	1	2	3	4	5	6	7
Production ton/ha	18,5	18,0	11,0	9,3	6,9	8,0	7,8	4,3

Note that decreases in yield are directly correlated with deterioration of orchard condition (normally associated with *Phytophthora* root rot.)

TABLE 10. Discounted cash flow.

Years	Extensive (6%)					Intermediate (14%)					Intensive (22%)				
	Cash flow	Tax	Net	Factor	Current value	Cash flow	Tax	Net	Factor	Current Value	Cash flow	Tax	Net	Factor	Current value
Immediate	(6 125)	—	(6 125)	1,000	(6 125)	(6 825)	—	(6 825)	1,000	(6 825)	(8 675)	—	(8 675)	1,000	(8 675)
1	(419)	—	(419)	0,943	(395)	(1 064)	—	(1 064)	0,877	(942)	(901)	—	(901)	0,826	(744)
2	(429)	—	(429)	0,890	(382)	(1 084)	—	(1 084)	0,769	(834)	(911)	—	(911)	0,683	(622)
3	(805)	—	(805)	0,840	(676)	(1 480)	—	(1 480)	0,675	(986)	210	—	210	0,564	118
4	(737)	—	(737)	0,792	(584)	(765)	—	(765)	0,592	(453)	2 118	—	2 118	0,467	989
5	(844)	—	(844)	0,747	(630)	(391)	—	(391)	0,519	(203)	3 527	—	3 527	0,386	1 361
6	581	—	581	0,705	410	260	—	260	0,456	119	5 610	831	4 779	0,319	1 525
7	792	—	792	0,665	527	908	—	908	0,400	363	6 882	2 890	3 992	0,263	1 050
8	2 415	—	2 415	0,627	1 514	2 675	—	2 675	0,351	939	7 782	3 268	4 514	0,218	984
9	2 641	—	2 641	0,592	1 563	3 143	—	3 143	0,308	968	7 382	3 100	4 282	0,180	771
10	3 427	629	3 052	0,558	1 561	4 411	—	4 411	0,270	1 191	7 782	3 268	4 514	0,149	673
11	4 102	1 723	2 379	0,527	1 254	5 857	335	5 522	0,237	1 309	7 782	3 268	4 514	0,123	555
12	3 812	1 601	2 211	0,497	1 099	6 821	2 865	3 956	0,208	823	7 782	3 268	4 514	0,102	460
13	1 706	717	989	0,469	464	5 871	2 466	3 405	0,182	620	6 832	2 869	3 963	0,084	333
14	1 636	687	949	0,442	419	6 821	2 865	3 956	0,160	633	7 782	3 268	4 514	0,069	311
15	487	205	282	0,417	118	6 821	2 865	3 956	0,140	554	7 782	3 268	4 514	0,057	257
16						6 821	2 865	3 956	0,123	487	7 782	3 268	4 514	0,047	212
17						6 421	2 697	3 724	0,108	402	7 382	3 100	4 282	0,039	167
18						6 821	2 865	3 956	0,095	376	7 782	3 268	4 514	0,032	144
19						6 271	2 634	3 637	0,083	302	7 232	3 037	4 195	0,027	113
20						6 821	2 865	3 956	0,073	289	7 782	3 268	4 514	0,022	99
					137					(868)					81
Internal rate of return					6%					13%					21%

**TABLE 11. Cash flow before tax and interest.**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Extensive																				
Net Profit	(840)	(850)	(1 060)	(835)	(559)	448	1 192	1 915	2 541	2 927	3 602	3 312	2 156	1 136	(13)					
Add Depreciation	421	421	430	448	465	483	500	500	500	500	500	500	500	500	500					
Less Capital	6 125	—	175	350	750	350	900	—	400	—	—	—	950	—	—					
Net flow	(6 544)	(429)	(805)	(737)	(844)	581	792	2 415	2 641	3 427	4 102	3 812	1 706	1 636	487					
Balance at beginning	—	(6 544)	(6 973)	(7 778)	(8 515)	(9 359)	(8 778)	(7 986)	(5 571)	(2 930)	497	4 599	8 411	10 117	11 793					
Balance at end R	(6 544)	(6 973)	(7 778)	(8 515)	(9 359)	(8 778)	(7 986)	(5 571)	(2 930)	497	4 599	8 411	10 117	11 793	12 240					
Intermediate																				
Net Profit	(1 520)	1 530	(1 740)	(888)	(131)	635	1 283	2 150	3 018	1 886	5 332	6 296	6 296	6 296	6 296	6 296	6 296	6 296	6 296	6 296
Add Depreciation	446	446	455	473	490	508	525	525	525	525	525	525	525	525	525	525	525	525	525	525
Less Capital	6 825	—	175	350	750	350	900	—	400	—	—	—	850	—	—	—	400	—	550	—
Net flow	(7 899)	(1 084)	(1 460)	(765)	(391)	260	908	2 675	3 143	4 411	5 857	6 821	5 871	6 821	6 821	6 821	6 421	6 821	6 271	6 821
Balance at beginning	—	(7 899)	(8 983)	(10 443)	(11 208)	(11 599)	(11 339)	(10 431)	(7 756)	(4 613)	(202)	5 655	12 476	18 347	25 168	31 989	38 810	45 231	52 052	58 323
Balance at end R	(7 899)	(8 983)	(10 443)	(11 208)	(11 599)	(11 339)	(10 431)	(7 756)	(4 613)	(202)	5 655	12 476	18 347	25 168	31 989	38 810	45 231	52 052	58 323	65 144
Intensive																				
Net Profit	(1 420)	(1 430)	(143)	1 757	3 557	5 397	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202
Add Depreciation	519	519	528	536	545	563	580	580	580	580	580	580	580	580	580	580	580	580	580	580
Less Capital	8 675	—	175	350	750	350	900	—	400	—	—	—	950	—	—	—	400	—	550	—
Net flow	(9 576)	(911)	210	2 118	3 527	5 610	6 882	7 782	7 382	7 782	7 782	7 782	6 832	7 782	7 782	7 782	7 782	7 382	7 782	7 232
Balance at beginning	—	(9 576)	(10 487)	(10 277)	(8 159)	(4 632)	978	7 860	15 642	23 024	30 806	38 588	46 370	53 202	60 984	68 766	76 548	83 930	91 712	98 944
Balance at end R	(9 576)	(10 487)	(10 277)	(8 159)	(4 632)	978	7 860	15 642	23 024	30 806	38 588	46 370	53 202	60 984	68 766	76 548	83 930	91 712	98 944	106 726

**TABLE 12. Profit before tax and interest.**

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Extensive																				
Production (t/ha)	—	—	—	0,8	1,6	4,0	6,0	7,5	8,8	9,6	11,0	10,4	8,0	6,3	3,5					
Income (R/ha)	—	—	—	385	771	1 928	2 892	3 615	4 241	4 627	5 302	5 012	3 856	3 036	1 687					
Expenses	840	850	1 060	1 220	1 330	1 480	1 700	1 700	1 700	1 700	1 700	1 700	1 700	1 700	1 700					
Profit before interest	(840)	(850)	(1 060)	(835)	(559)	448	1 192	1 915	2 541	2 917	3 602	3 312	2 156	1 136	(13)					
Balance at beginning	—	(840)	(1 690)	(2 750)	(3 585)	(4 144)	(3 696)	(2 504)	(589)	1 952	4 879	8 481	11 793	13 949	15 085					
Balance at end R	(840)	(1 690)	(2 750)	(3 585)	(4 144)	(3 696)	(2 504)	(589)	1 952	4 879	8 481	11 793	13 949	15 085	15 072					
Intermediate																				
Production (t/ha)	—	—	—	2,1	3,9	5,8	7,6	9,4	11,2	13,0	16,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0
Income (R/ha)	—	—	—	1 012	1 879	2 795	3 663	4 530	5 398	6 266	7 122	8 676	8 676	8 676	8 676	8 676	8 676	8 676	8 676	8 676
Expenses	1 520	1 530	1 740	1 900	2 010	2 160	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380	2 380
Profit before interest	(1 520)	(1 530)	(1 740)	(888)	(131)	635	1 283	2 150	308	3 886	5 332	6 296	6 296	6 296	6 296	6 296	6 296	6 296	6 296	6 296
Balance at beginning	—	(1 520)	(3 050)	(4 790)	(5 678)	5 809	(5 174)	(3 891)	(1 741)	1 277	5 163	10 495	16 791	13 087	29 383	41 975	48 271	54 567	60 863	6 715
Balance at end R	(1 520)	(3 050)	(4 790)	(5 678)	5 809	(5 174)	(3 891)	(1 741)	1 277	5 163	10 495	16 791	23 087	29 383	35 679	48 271	54 567	60 863	67 159	7 345
Intensive																				
Production (t/ha)	—	—	2,9	7,1	11,3	15,4	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6	19,6
Income (R/ha)	—	—	1 397	3 422	5 432	7 422	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447	9 447
Expenses	1 420	1 430	1 540	1 665	1 875	2 025	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245	2 245
Profit before interest	(1 420)	(1 430)	(143)	1 757	3 557	5 397	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202	7 202
Balance at beginning	—	(1 420)	(2 850)	(2 993)	(1 236)	2 321	7 718	14 920	22 122	29 324	36 526	43 728	50 930	58 132	65 334	72 536	79 738	86 940	94 172	101
Balance at end R	(1 420)	(2 850)	(2 993)	(1 236)	2 321	7 718	14 920	22 122	29 324	36 526	43 728	50 930	58 132	65 334	72 536	79 738	86 940	94 172	101 344	108