

# Lamb Hass evaluation at Westfalia Estate – final report

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## ABSTRACT

Avocado cultivars Lamb Hass and Hass were evaluated at Westfalia Estate (Duivelskloof) and at Goedgelegen Estate (Mooketsi) for several years. 'Lamb Hass' fruit matured from August to October, i.e. later in the year than 'Hass' which reached maturity at the end of May. At Westfalia, cumulative yield (1995-2000) was 79.8 t/ha for 'Lamb Hass' and 45.8 t/ha for 'Hass'. At Goedgelegen, cumulative yield (1998-2000) was 57.6 t/ha for 'Lamb Hass' and 52.5 t/ha for 'Hass'. Both cultivars, 'Lamb Hass' and 'Hass', had an alternate bearing pattern. With regard to fruit size distribution, 'Lamb Hass' was typically larger than 'Hass' and the average 'Lamb Hass' fruit size was count 12 to 14 (266 g – 365 g). The quality of early season 'Lamb Hass' fruit was slightly inferior to that of mid season 'Hass'. As 'Lamb Hass' also matured two months later than 'Hass', 'Lamb Hass' should be seen as a cultivar to prolong the avocado season, rather than as a replacement for 'Hass'.

## INTRODUCTION

'Hass' trees produce a large percentage of undersized fruit, causing high financial losses in the South African avocado industry. In the long term, the 'Hass' small fruit problem could be solved by replacing 'Hass' with a new Hass-like cultivar with bigger fruit size. In 1991, a long term project was undertaken and budwood of the new Hass-like cultivar, 'Lamb Hass', was imported from California. 'Lamb Hass' was then tested at Westfalia and Goedgelegen Estates for a period of nine years, and this paper presents a final report on the evaluation of the cultivar 'Lamb Hass'.

## MATERIALS AND METHODS

'Lamb Hass' was top-worked at Westfalia Estate near Duivelskloof (a warm, moist area) in 1993 and at Goedgelegen Estate near Mooketsi (a hot, dry area) in 1995. For comparison, trees were also top-worked to 'Hass'.

Data on fruit maturity, yield, fruit size distribution and fruit quality after simulated export were collected as described previously (Kremer-Köhne, 1999 & 2000). Fruit firmness readings were taken

with a densimeter (Köhne *et al.*, 1998) upon removal from cold storage. In 2000, two test consignments of 'Lamb Hass' fruit were exported to Europe on vessels 738 and 739. Results on postharvest fruit quality are presented for the samples (80 fruit each) that underwent simulated shipment according to the commercial temperature regime designed for late season 'Hass' fruit with a moisture content of 65% (5.5/5.0/3.5°C).

## RESULTS

In 2000, the fruit moisture content of 'Lamb Hass' and 'Hass' followed a pattern similar to that obtained for 1999 (Kremer-Köhne, 2000). At both sites, 'Hass' had a consistently lower moisture content at a particular sampling date than 'Lamb Hass' which agrees with Californian findings of Hofshi *et al.* (2000). 'Hass' reached picking maturity (75% moisture) at the end of May and Lamb Hass fruit matured as from August. The maximum moisture content suggested for picking 'Lamb Hass' is 73% (Kremer-Köhne, 2000). As from mid July, individual 'Lamb Hass' fruits started colouring up on the trees, indicating a variation in fruit maturity on the same tree. This necessitates either selective picking for export or colour sorting of fruit in the packhouse to avoid postharvest problems related to storage temperatures e.g. cold damage.

Yield data for 'Lamb Hass' and 'Hass' are presented in Tables 1 and 2. It is evident that Lamb Hass trees were more precocious than 'Hass' trees, and that 'Lamb Hass' trees produced a considerably higher cumulative yield than 'Hass' at Westfalia and Goedgelegen respectively. After the 'off' year 1999, 'Lamb Hass' and 'Hass' bore a heavy crop in 2000. Both cultivars, 'Lamb Hass' and 'Hass', had an alternate bearing pattern. The fruit size distribution curves of 'Lamb Hass' and 'Hass' at Westfalia and Goedgelegen are shown in Figures 1 and 2. Fruit size varies with crop size and tree condition, but 'Lamb Hass' is typically larger than 'Hass' and the average 'Lamb Hass' fruit size is count 12 to 14 (266 – 365 g). In 1998, however, 'Hass' and 'Lamb Hass' were very similar in their count distribution (Figure 1) due to deteriorating tree condition in the test orchard.

**Table 1 Yields of avocado cultivars 'Lamb Hass' and 'Hass' at Westfalia Estate (top-worked 1993) for the years 1995 through 2000.**

Cultivar	Yield (t/ha) <sup>1)</sup>						Cumulative
	1995	1996	1997	1998	1999	2000	
Lamb Hass	16.6	6.2	2.0	25.6	0	29.4	79.8
Hass	-	-	1.5	23.3	0	21.0	45.8

<sup>1)</sup> based on 200 trees/ha

**Table 2 Yields of avocado cultivars 'Lamb Hass' and 'Hass' at Goedgelegen Estate (top-worked 1995) for the years 1998 through 2000.**

Cultivar	Yield (t/ha) <sup>1)</sup>			Cumulative
	1998	1999	2000	
Lamb Hass	15.8	6.8	35	57.6
Hass	2.9	16.6	33	52.5

<sup>1)</sup> based on 200 trees/ha



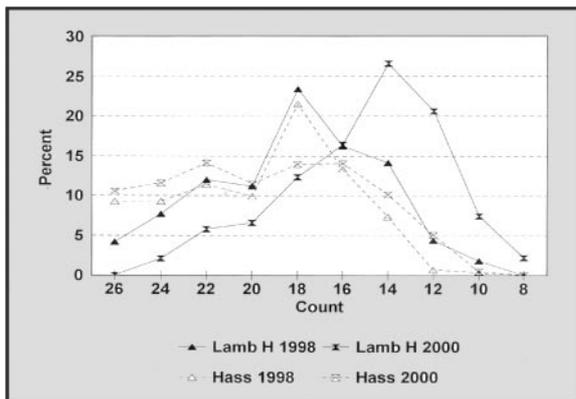
Results on postharvest fruit quality of 'Lamb Hass' and 'Hass' after simulated shipment are shown in Table 3. When comparing an

early season 'Lamb Hass' with a late season 'Hass' fruit, 'Lamb Hass' fruit is more watery and takes longer to ripen than 'Hass' fruit. Late season 'Lamb Hass' fruit, however, are of quite acceptable quality, better than any other commercial avocado at that time of the year. With regard to post-harvest handling, 'Lamb Hass' fruits colour up while the fruit are still firm, and are eat-ripe at a slightly higher densimeter reading than 'Hass' fruit. The high incidence of cold damage in 'Lamb Hass', particularly in the sample for vessel 738, was caused by the fact that 'Lamb Hass' was shipped at the temperature regime recommended for late season 'Hass' (5.5/5.0/3.5°C) as there were predominantly 'Hass' pallets in the container. Early season 'Lamb Hass' should be exported at a temperature regime warmer than that for late season 'Hass' to prevent cold damage.

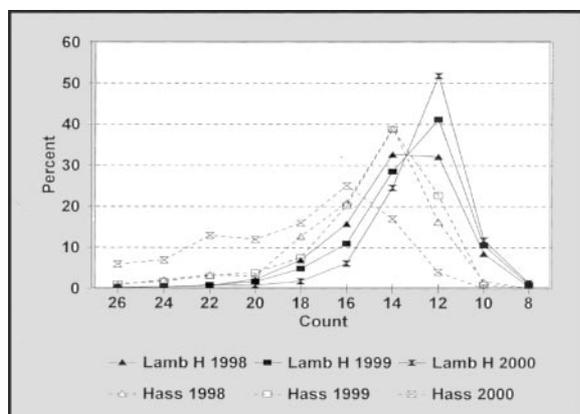
**Table 3 Postharvest fruit quality of 'Lamb Hass' and 'Hass' after simulated shipment at the late season 'Hass' temperature regime (5.5/5.0/3.5°C). Symptoms were rated on a scale of 0 (no symptom) to 3 (severe symptom).**

Vessel	738		739	
Into storage	31/08/2000		11/09/2000	
Out of storage	28/09/2000		05/10/2000	
<b>Cultivar</b>	<b>Lamb Hass</b>	<b>Hass</b>	<b>Lamb Hass</b>	<b>Hass</b>
Evaluation upon removal from cold storage				
Densimeter	94	92	93	92
Black cold	0.333	0.022	0.021	0.059
Brown cold	0	0.033	0.084	0
Lenticel damage	0.013	0.109	0.018	1.020
Evaluation when eat ripe				
Anthraxnose	0.231	0.054	0.333	0.216
Stem end rot	0.115	0.087	0.540	0.539
Grey pulp	0.013	0	0.312	0.039
Vascular browning	0.077	0	0.567	0.039
% Fruit black	100	100	100	100
Days to ripen	7.5	5.5	6.0	5.3

Based on feedback from Westfalia Marketing the 'Lamb Hass' test consignments (vessels 738 and 739) this season confirmed characteristics of the fruit being different to 'Hass' as described above. These results strongly suggest that 'Lamb Hass' cannot simply be marketed as a late 'Hass' but should be handled as a separate cultivar, different from late season 'Hass'.



**Figure 1 Fruit size distribution of the avocado cultivars 'Lamb Hass' and 'Hass' at Westfalia Estate for the years 1998 and 2000 (there was no crop in 1999). The count sizes are based on a 4 kg carton.**



**Figure 2 Fruit size distribution of the avocado cultivars 'Lamb Hass' and 'Hass' at Goedgelegen Estate for the years 1998 through 2000. The count sizes are based on a 4 kg carton.**

**CONCLUSIONS**

'Lamb Hass' topworks bore initial prolific yields and had the tendency to be alternate bearing. Good tree condition was found to be essential for good fruit size. Early season 'Lamb Hass' fruit quality was slightly inferior to that of mid season 'Hass' and the postharvest handling of 'Lamb Hass' should be separate from that of late season 'Hass'. As 'Lamb Hass' also matures two months later than Hass and can hang even longer, 'Lamb Hass' should be seen as a cultivar to prolong the avocado season rather than as a replacement for 'Hass'.

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