The Influence of Primary Processing Methods on the Cup Taste of Arabica Coffee from the Indonesian Island of Flores

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SUMMARY

The cup taste profile of specialty coffee origins is commonly attributed to a broad range of climatic, environmental and geographic factors unique to each area of production. The method of processing fresh coffee cherry to green bean is less commonly considered as a major factor in a coffee's unique cup taste. This research investigated how coffee processing method can influence coffee cup taste by evaluating 3 commercial coffee processing methods in use in the Indonesian specialty coffee origin of "*Bajawa*" on the island of Flores. The 3 processing methods assessed were: *Full-Washed* (*FW*), *Wet-hulled (WH)* and *Pulped-Natural (PN)*.

Fresh coffee cherry of 3 separate varieties (*Typica, S795* and *Hibrido de Timor (HdT)*) was harvested and processed to dry coffee by three different processing methods. Three replications of each of the 3 processes x 3 varieties were conducted, giving 27 samples. Each of the 3 replications within each process x variety group was combined to produce 9 composite samples. 67 coffee cuppers in Indonesian, USA and Australia evaluated the 9 samples by using a blind cupping, comparative preference testing methodology.

Cupper's preferences revealed that processing method clearly influenced coffee cup taste. *PN* processing was ranked the most preferred by cuppers across all 3 varieties. In Indonesia *PN* is often viewed as an inferior form of processing. However, the research demonstrated that applying consistent quality control to *PN* processing can produce high quality coffee in Flores. *PN* processing has a number of advantages in Flores's relatively dry environment, highlighting opportunities for the investigation of this processing method in this origin in order to develop unique flavor profiles which are preferred by the international specialty coffee industry. This research also highlights the importance of considering traditional practices and local conditions along with market requirements when making recommendations for coffee value adding and quality improvement.

BACKGROUND

Flores lies within the Lesser Sunda island chain of Eastern Indonesia and is characterised by a relatively dry agro-ecological climate where surface water is scarce and the coffee season coincides with a dry season. Flores produces an estimated 3000 tons of Arabica coffee of 3 main varieties, *Typica, S795* and *Hibrido de Timor*, all by smallholder growers at altitudes from 1000 m to 1400 m. A typical coffee farm in Flores is characterized by minimal inputs of both capital and labour, with an almost total absence of synthetic fertilisers and farm chemicals, but with a high level of staple food production of both maize and rice. Food

security concerns appear to be an important factor inhibiting greater investment in improved coffee farm management (Neilson et al., 2010).

The Flores coffee industry is undergoing rapid change, with commercial traders introducing a diversity of coffee processing and trade systems. (Marsh and Neilson, 2007). These new entrants to the Flores coffee industry have largely chosen to bypass *PN* processing and increasing numbers of farmers are encouraged to sell fresh cherries to cooperatively-owned processing units to be processed as *FW* or to prepare wet-parchment coffee for sale to be processed as *WH* by commercial buyers. However, the majority of farmers still use traditional *PN* processing and sell ungraded green beans. Both *FW* and *WH* require relatively large amounts of water (up to 5 liters per kg of cherry) for the washing stage of the process with equivalent amounts of waste water being produced. *WH* is an Indonesian variation of the FW process where fully washed parchment is hulled while still at 30% to 40% mc to produce a green bean ready for drying. *PN* is the drying of coffee with the mucilage intact on the parchment after the skin of the fresh cherry is removed by a pulper, with no washing. This process is also described as *"Descascado"*.

Traditional farmer-processed *PN* coffee from Flores is often viewed as inferior, as it can have flavour defects, due to poor quality control at farmer level such as non-selective harvesting, delayed pulping and haphazard drying. This research compares the merits of applying quality controls to the traditional method of *PN* processing with the two newly introduced processing systems. This research attempts to determine if *PN* processing creates inherently lower quality coffee, while at the same time considering the environmental, resource and financial constraints of the Flores farm system.

METHODS

Fresh coffee cherry (300 kg) of a single variety was harvested and sorted to a high standard and then divided into three identical 100 kg lots of cherry. Each lot of cherry was processed by one of three different process methods to yield dry coffee. This process was twice repeated during the coffee season, giving 3 replication samples for each process method for a single variety. The entire procedure was replicated using 2 further coffee varieties giving 27 samples representing 3 repetitions of 3 process methods applied to 3 varieties of coffee, all processed on the same site during a 6 week period in 2009 coffee season.

Each process x variety group of 3 replication samples was cupped by the ICCRI cupping panel and found to have good consistency. Each of the 3 replications within each group were then combined to produce 9 composite samples, representing 3 process methods applied to 3 varieties of coffee.

Sets of 9 x 300g samples were sent with randomly chosen blind sample codes (A to I) for cupping by 67 of speciality cuppers and coffee industry professionals in Indonesia, USA and Australia. Cuppers were presented with 3 sets of 3 blind samples and informed that each of the 3 sets of coffee were of a single undisclosed variety which had been processed 3 ways. Using the blind cupping, comparative preference testing methodology cuppers were asked to rank each coffee in the set of 3 according to their personal or commercial preference from "Prefer Most" "Mid Preference" to "Prefer Least".

The "Melbourne Preference" data was obtained from a cupping workshop held in November 2009 where 43 cuppers assessed the 9 samples, blind cupping from coffee samples prepared in air pots. The "International Preference" data was obtained from 24 cuppers who

participated in 5 separate evaluations in: USA (2 commercial coffee companies with 2 and 3 cuppers) Australia (5 cuppers), ISCA (Indonesian Speciality Coffee Association, 11 cuppers) and ICCRI (3 cuppers). 30 cuppers also evaluated the samples using the SCAA (American Speciality Coffee Association) cupping evaluation methodology.
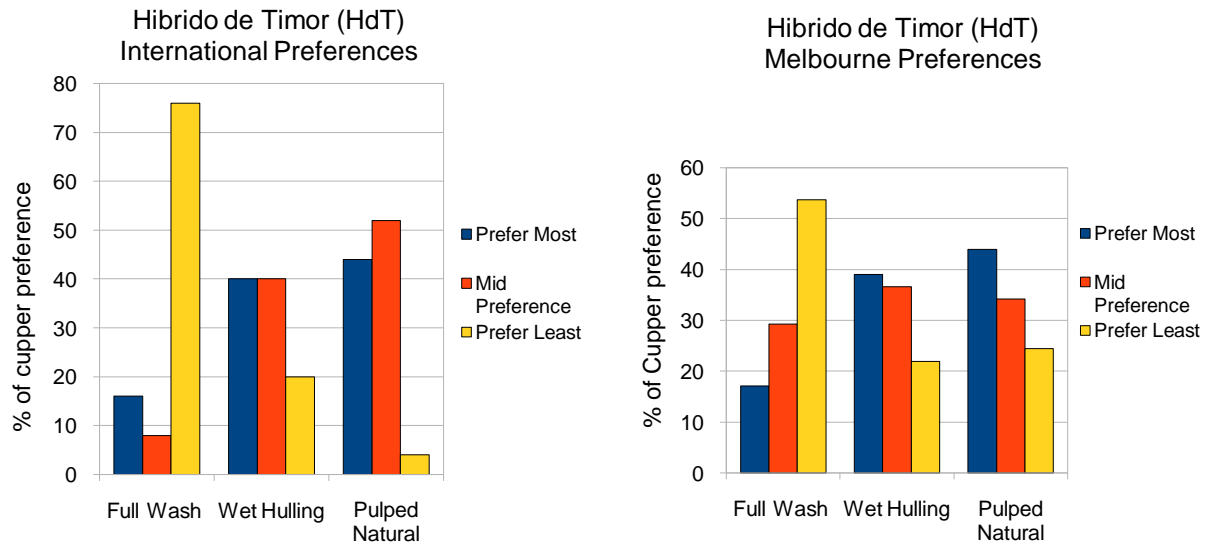
RESULTS

Figure 1. Preference cupping results for *Hibrido de Timor* (*HdT*).

The *HdT PN* was the ranked the Most Preferred by the larger proportion of cuppers in both International (44%) and Melbourne (43%) cuppings and also received a high proportion of the Mid Preference ranking (52% and 35%). *WH* was ranked Most Preferred by the second largest proportion of cuppers in both cupping groups (39% and 40%) and also received a high proportion of the Mid Preference ranking (37% and 40%). FW in contrast, was ranked Least Preferred with a high proportion of both groups giving it the lowest ranking; Melbourne (76%) and International (54%).
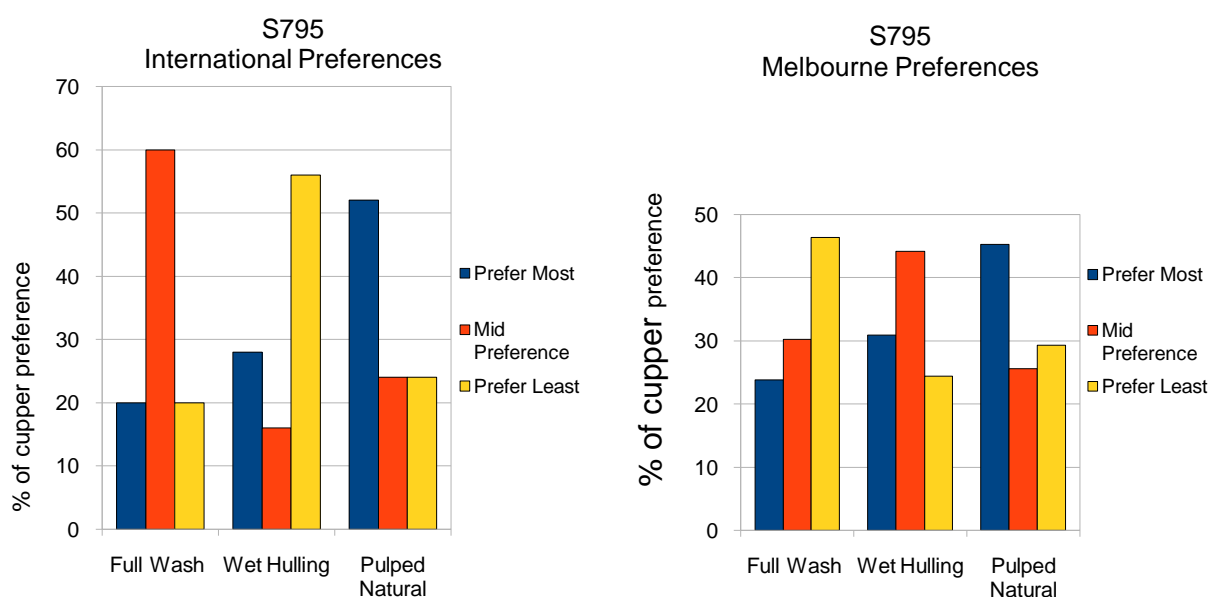

Figure 2. Preference cupping results for *S795*.

The *S795 PN* was ranked the Most Preferred by the larger proportion of cuppers in both International (53%) and Melbourne (46%) cuppings. *WH* was ranked Most Preferred by the second largest proportion of cuppers in both cupping groups (28% and 31%). However Mid and least Preferences for PN, WH and FW were not consistent between the two cupping groups indicating the preferences due to processing method may not be pronounced for this variety.
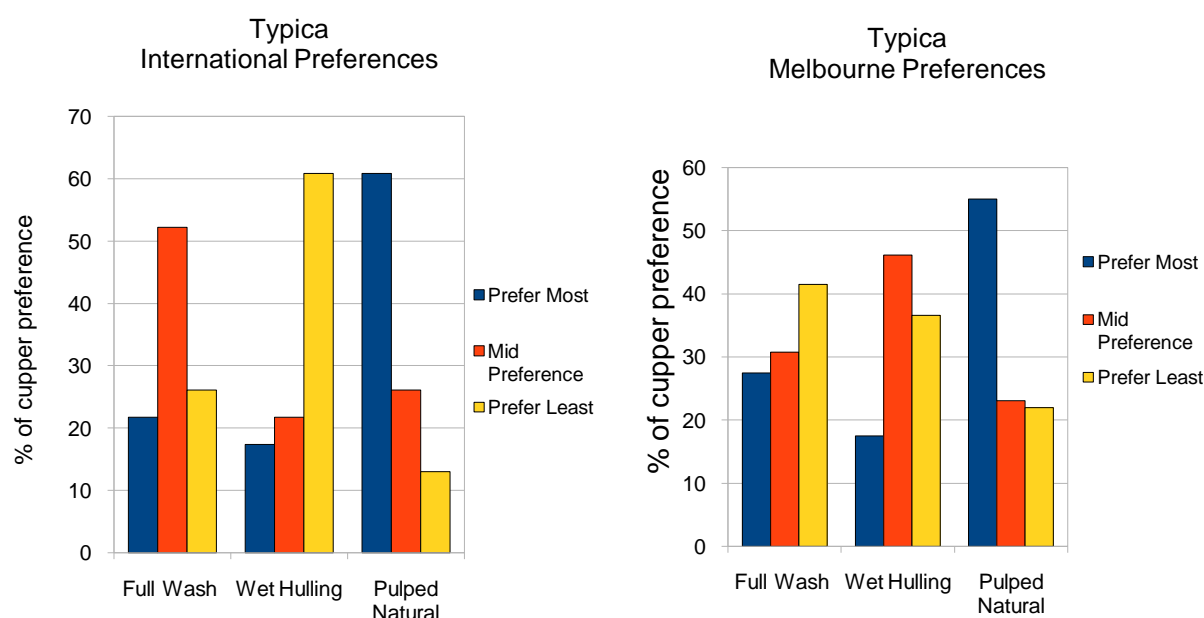

Figure 3. Preference cupping results for *Typica*.

Table 1. SCAA Cupping Data for 9 samples.

Blind Code	Variety	Process	CQI (5)	ICCRI (9)	SCAI (8)	Commercial (8)	Average 30 of Cuppers
H	*Hibrido de Timor*	Full Wash	79.75	79.63	81.16	74.31	78.64
C	*Hibrido de Timor*	Pulped Natural	76.95	78.44	82.38	76.47	78.71
F	*Hibrido de Timor*	Wet Hulling	77.95	83.09	82.13	78.13	80.65
A	*S 795*	Full Wash	80.20	83.92	83.25	80.25	82.14
D	*S 795*	Pulped Natural	80.75	81.93	83.25	81.78	82.04
G	*S 795*	Wet Hulling	79.15	83.52	82.03	82.72	82.18
E	*Typica*	Full Wash	78.40	79.09	82.19	75.84	78.94
I	*Typica*	Pulped Natural	77.45	78.26	82.00	79.38	79.28
B	*Typica*	Wet Hulling	75.30	79.39	79.98	75.66	77.87

The *Typica PN* was ranked the Most Preferred by the larger proportion of cuppers in both the International (61%) and Melbourne (55%) cuppings. *FW* was ranked Most Preferred by the second largest proportion of cuppers in both groups (22% and 28%). Mid and Least Preferred for *PN, WH* and *FW* were not consistent between the two cupping groups, however *WH* was clearly Preferred least by International cuppers (61%) and the second highest Preferred Least in Melbourne (36%).

The average SCAA scores (maximum 100 points) is presented for 4 groups of cuppings, CQI (Coffee Quality Institute): 5 cuppers, ICCRI: 9 cuppers, ISCA: 8 cuppers, Commercial speciality coffee companies in the USA: 8 cuppers. The average score for each sample for all 30 Cuppers is also presented. SCAA cupping methodology is an internationally recognised system of sensory evaluation of a coffee's flavor. It assesses and scores 10 specific flavour and quality attributes and gives a numerical indicator of a coffee's commercial value on a scale out of 100.

DISCUSSION OF RESULTS

Results demonstrate a clear preference for *PN* processing for all 3 varieties across 2 cupping groups with *Typica* variety receiving the highest preference for PN processing.

The *HdT PN* was ranked the Most Preferred sample by the larger proportion of cuppers in both groups. The *WH* was also a highly preferred method of processing for HdT. *FW* was ranked Least Preferred by a high proportion of cuppers in both groups. These results indicate that the *HdT* variety performs best when processed as *PN* and *WH* and is far less preferred when processed as *FW*. The average SCAA score for the *HdT FW* was the lowest of the 3 process methods for this variety. In earlier ICCRI coffee variety research, *HdT* was noted to have improved quality when processed by *WH* rather than by *FW*.

The *S795 PN* was ranked the Most Preferred by the larger proportion of cuppers in both groups, while *WH* was ranked Most Preferred by the second largest proportion of cuppers in both cupping groups. However Mid and Least Preferred for *PN, WH* and *FW* varied between the two cupping groups indicating the preferences due to processing method may not be pronounced for this variety. SCAA scoring gave S795 *PN, WH* and *FW* the highest scores for all samples indicating that the S795 variety creates consistently good coffee under all 3 processing systems.

The *Typica PN* was ranked Most Preferred by 61% of International cuppers and 55% of Melbourne cuppers. *FW* was ranked Most Preferred by the second largest proportion of cuppers in both groups. *WH* was Preferred Least by the largest proportion of International cuppers (61%) and received the second highest Preferred Least in Melbourne (36%). SCAA scores for Typica *WH* were the lowest of the 3 process methods for this variety. This reflects previous ICCRI coffee variety research where Typica was noted to have improved quality when processed by *FW* rather than by *WH*.

SCAA cupping results confirm that all 9 coffees samples were good quality coffees and that all varieties and processes scored in relatively tight range of 77.87 to 82.18 points out of maximum of 100. The results for SCAA cuppers were less conclusive in determining differences due to processing, as this quality evaluation system gives a commercial rating to coffees based on the intensity of specific coffee cup characteristics such fragrance, aroma, flavour, acidity, body, and the presence of essential components such as sweetness and balance rather than taster preferences. Only 10% of points are allocated for the cupper's

personal preference in the SCAA scoring methodology and coffees with different flavor characteristics can achieve similar overall SCAA scores. Thus, SCAA scores serve to demonstrate that the samples are of a good quality, but do not identify the presence or difference of particular flavours created by different processing methods.

CONCLUSIONS

This research demonstrates that under Flores conditions and for the 3 varieties evaluated, *PN* processing creates a highly preferred coffee compared to *FW* and *WH*, indicating that processing does have an identifiable influence on cup taste.

PN processing is often viewed as an inferior form of processing, perhaps because of its relative low technology and is often inconsistent due to poor quality control by smallholders. If consistent quality control is applied to *PN* processing this research shows that the resulting coffee is highly preferred by the specialty coffee industry. The demonstrated quality results for *PN,* coupled with the low water use, low waste output and minimal processing equipment requirement indicates that *PN* processing in the Flores coffee industry warrants further investigation.

The similar SCAA scores for each of the 3 processes for each variety demonstrates that all coffees samples were of good quality and of a similar commercial quality. The results also indicate that SCAA system effectively reduces the effect of cupper's preferences in its scoring system as there was a clear preference for *PN* in all 3 varieties which was not evident in the SCAA results.

SCAA scores also demonstrated that there are clear differences between varieties with *S795* scoring 2 to 3 points higher than *Typica* and *HdT* for all forms of processing. The influence of varieties on cup taste is the subject of a related paper from this research.

The preference testing results also indicated that, under Flores conditions, individual varieties respond to specific processing. Results indicate that *HdT* is more preferred if processed by *WH* or *PN* while *Typica* is more preferred if processed by *PN* or *FW*. The influence of cup taste by specific processing methods on specific Arabica varieties is the subject of a related paper from this research.

REFERENCES

Marsh,A., Neilson,J,. (2007). Securing the Profitability of the Flores coffee industry. ACIAR Report.

Mawardi,S., Yusianto, Hulupi,R., Khalid, Marsh,A., (2007). Evaluation of Variety Cupping Profile of Arabica Coffee Grown at Different Altitudes and Processing Methods in Gayo Highland of Aceh (Sumatra). ASIC 2008, Campinas.

Neilson, J., Arifin, B., Fujita, Y., Hartatri, D.F. S., (2010). Quality upgrading in specialty coffee chains and smallholder livelihoods in Eastern Indonesia: opportunities and challenges. ASIC 2010, Bali.