

Evaluating consumer responses for Ripe and Ready pears

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Food Science Australia

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EVALUATING CONSUMER RESPONSES FOR PRE- RIPENED PACKHAM PEARS

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MEDIA SUMMARY

The success of Ripe and Ready Packham pears in Queensland has led two major supermarkets chains to introduce and promote pre-ripened Packham pears nationwide. The supermarkets have responded to the potential for growing the Packham pear category differently and this has led to variation in the specifications for pre-ripened pears. The changes to the category have been made with limited consumer insights and therefore the pear industry sees a need for consumer that can evaluate consumer preferences for firmness in pre-ripened pears.

The current project aimed to determine whether a market for pre-ripened pears exists. Sensory and consumer research was carried out to investigate whether, (a) Packham pears of different firmness specifications could be perceived as different and (b) if so, what firmness level was most preferred by consumers. In addition, penetrometry measurements were carried out as an instrumental measurement of pear firmness.

Consumer research was conducted with 122 pear consumers from the Sydney metropolitan area. Measures were taken to insure that “Perfectly Ripe” pears fell within ripeness specifications. The results showed that:

- The ripest Packham pears (“Perfectly Ripe”; 2-4 kg) were most preferred.
- Approximately 1/3 of consumers liked the un-ripened Packham pears (6-9 kg).
- Consumers perceived “Perfectly Ripe” (2-4 kg) pears to be ripest, juiciest, sweetest and least firm, whereas the un-ripened Packham pears (6-9 kg) were perceived the least ripe, the least juicy, the least sweet and the firmest.
- Consumers who preferred the ripest pears category bought pears at the same ripeness stage as the overall group, but they expressed a larger interest in pre-ripened pear concepts. There were no differences between consumers of the different categories in terms of demographic profiles.

The findings of the current study suggest there may be a market for pre-ripened Packham pears. Pear quality in this stage of ripeness is hard to control. Therefore to further grow the market of pre-ripened Packham pears, a reliable, homogeneous product quality that meets with the consumers’ expectations, must be developed.

TECHNICAL SUMMARY

The success of Ripe and Ready Packham pears in Queensland has led two major supermarket chains in Australia to introduce and promote Ripe and Ready Packham pears in their stores nationwide. The supermarkets have responded to the potential for growing the volume of the Packham pear category differently and this has corresponded to variation in the specifications for what constitutes Ripe and Ready fruit. One of the supermarkets has two lines (one ripe and one firm) whereas the other only sells one line of Ripe and Ready pears. The specifications of the Ripe & Ready pears differ depending on the eventual vendor and this in turn has led to confusion amongst producers. The changes to the category have been made with limited insights on what the consumer regards as the most desirable level of firmness for a Ripe and Ready Packham pear. The pear industry therefore sees a need for consumer research which identifies the consumer preferences for firmness for Ripe and Ready pears.

The current project aimed to understand where the “Ripe and Ready” pears fit in the market. Sensory and consumer research was conducted to investigate whether Packham pears of different firmness levels can be perceived as different by consumers and if so - what level of pear firmness is preferred by consumers. In addition, penetrometry measurements were carried out as an instrumental measurement of pear firmness.

Sensory research (triangle tests) with 30 subjects was carried out with Packham pears of three levels of ripeness. The results showed that:

- There were no perceptible differences between “Perfectly Ripe” (2-4 kg) and “Ripe & Ready” (4-6 kg) pears, but penetrometry results showed that average firmness levels were very close.
- There were perceptible differences between “Perfectly Ripe (2-4 kg)” and un-ripened (6-9kg) pears, and between “Ripe & Ready” (4-6 kg) and un-ripened (6-9 kg) pears

Subsequently, consumer research was conducted with 122 pear consumers from the Sydney metropolitan area. Penetrometry measures were taken to ensure that “Perfectly Ripe” pears fell within ripeness specifications. The results showed that:

- The ripest Packham pears (“Perfectly Ripe”; 2-4 kg) were most preferred.
- Approximately 1/3 of consumers liked the un-ripened Packham pears (6-9 kg).
- Consumers perceived “Perfectly Ripe” (2-4 kg) pears to be ripest, juiciest, sweetest and least firm, whereas the un-ripened Packham pears (6-9 kg) were perceived the least ripe, the least juicy, the least sweet and the firmest.
- Consumers who preferred the ripest pears category bought pears at the same ripeness stage as the overall group, but they expressed a larger interest in pre-ripened pear concepts. They consumed fewer pears in the unripened stage, but the same percentage of pears in the (very) ripe stage as compared to the total group.

Penetrometry measurements showed:

- There was a large within-batch as well as between batch variability for Packham pears. This was especially true for the “Perfectly Ripe” (2-4 kg) category. The results indicate that the results of the studies can only be extended to the batches tested.

Based on consumer sensory preferences, there appears to be a market for pre-ripened Packham pears and the softest category (2-4 kg) seems to be the most liked. To ensure the success of such concepts, at least two aspects need to be considered. Firstly, although the “Perfectly Ripe” stage of firmness (2-4 kg) is the most preferred, it seems to be the category that is hardest to meet the product specifications. In order to further grow the market of Ripe & Ready Packham pears, a reliable, homogeneous product quality that meets consumers’ expectations will be necessary. Secondly, this study was primarily aimed at identifying consumer preferences. The study has shown that consumers have an interest in the concept of a pre-ripened pear. Since these concepts may potentially be more expensive to produce, it is recommended that further research be conducted to investigate the additional price consumers are willing to pay.

1. Introduction

The success of “Ripe and Ready” Packham pears in Queensland triggered two major supermarkets to introduce and promote “Ripe and Ready” Packham pears in store. This has led to a significant growth in sales nationwide over the last three years such that last year 24% of all Packham pears sold were “Ripe and Ready”. However, the pear industry currently lacks hard data on the differential consumer preferences for “Ripe and Ready” or “un-ripened” Packham pears.

Both supermarkets have responded to the potential for growing the volume of the Packham pear category differently and this has led to variation in the specifications made for “Ripe and Ready” fruit. One supermarket currently has two lines of Packham pears: one ripe and one firm whereas the other only sells one line of “Ripe and Ready” pears. As a result one of the supermarkets has attempted to differentiate their “ripe” line from the other pears by labeling the ripe pears “Perfectly Ripe”. These changes to the category have been made with limited industry consultation or consumer data on what level of firmness constitutes “perfectly ripe” and what consumers expect from a “Ripe and Ready” Packham pear. There is therefore a need for consumer research which identifies the consumer preferences for firmness in “Ripe and Ready” pears. Horticulture Australia Unlimited (HAL) has enlisted Food Science Australia (FSA) to conduct sensory and consumer research on pear firmness using a representative population of pear consumers.

The test was divided into two parts. Initially, a sensory difference test was conducted to ensure that the specified levels of firmness were perceptibly different. Thereafter, consumer preferences were collected from a large population of pear consumers. Penetrometry measurements were taken during both stages of the evaluation to monitor the consistency sample supply.

The objectives of these studies were:

1. To determine if there are perceptible differences in the firmness of “Perfectly ripe”, “Ripe and Ready” and “Non-ripened” Packman pears.
2. To determine consumer preferences for Packham pears of three firmness categories
3. To determine what proportion of consumers prefers soft “Ripe and Ready” pears over hard “Non-ripened” pears
4. To determine what the purchase preferences are in terms of flesh firmness at the time of purchase for people who prefer soft “Perfectly Ripe” and “Ripe and Ready” pears.
5. To characterize consumers who (express an interest in) buy(ing) “Ripe and Ready” pears in terms of pear consumption habits and demographics.

2. Methods and materials

2.1 Triangle test

2.1.1 Products

Packham pears in three different stages of ripeness were supplied:

- A) “Perfectly Ripe” (2-4 kg)
- B) “Ripe and Ready” (4-6 kg)
- C) Non-ripened (6-9 kg)

Upon arrival, the pears were stored at 2°C until approximately 6-8 hours before the test. The pears were washed and dried and placed in the sensory kitchen to reach room temperature. Pear samples of 4-4.5 cm length, 1-1.5 width and 2-2.5 cm height (including the skin) were cut and immediately stored in sealed three-digit coded plastic containers. The samples were served to the panellists within 15 minutes after cutting. To account for within-batch variability, a maximum of three samples were cut from the same fruit, and samples within a triangle all derived from different fruits.

2.1.2 Panel

The panel consisted of 30 panellists that each evaluated three triangles. Panellists were recruited internally at FSA/CSIRO. All participants were regular pear consumers. The panel consisted of 37% men and 63% women and had an average age of 39.6 (± 11.6) years.

2.1.3 Procedure

The evaluations were carried out in the sensory booths of the sensory laboratory of FSA, using red lighting to mask possible colour differences between the samples. Each panellist evaluated three triangles:

- One triangle comparing “Perfectly Ripe” and “Ripe and Ready”
- One triangle comparing “Perfectly Ripe” and “Unripe”
- One triangle comparing “Ripe and Ready” and “Unripe”

The combination of samples within a triangle was randomised over the subjects, thus AAB, ABA and BAA were equally represented, as were BBA, BAB and ABB. The order of the three triangles was balanced over the subjects. In addition, the design ensured that each panellist was exposed to each product variety an equal number of times.

The subjects were unaware of the combinations they received. For each triangle test the subject had to pick the odd one out of the three samples. A forced choice paradigm was used such that subjects had to choose a sample even when they were unsure of the difference. Panellists were also afforded the opportunity to include comments on what they perceived the difference to be.

2.1.4 Data analysis

The results of each of the three triangle tests was analysed separately. For each triangle, the number of correct responses (correctly identified odd samples) was determined. A significance level of 5% was set. The number of correct responses was compared to the critical number of correct responses (Table T8, p. 369, Meilgaard, Civille & Carr, 1999) to determine whether the samples were significantly different.

2.1.5 Penetrometry

Penetrometry measurements were carried out in tandem with the sensory evaluation. Penetrometry measures the force required to drive a standard penetrating stamp into the sample. A small slice of the skin was removed prior to the measurement. Thirty samples of each batch were measured in duplicate.

2.2 Consumer preference test

2.2.1 Product

As with the triangle test, pears in three different stages of ripeness were supplied for the consumer test:

- A. “Perfectly ripe” (2-4 kg)
- B. “Ripe and Ready” (4-6 kg)
- C. Un-ripened (6-9 kg)

The protocol for storage and preparation was identical to that used for the triangle test.

The initial quality of the “Perfectly Ripe” pears was lower than that of the first batch and a result 20% of the pears had to be discarded due to brown spotting. Overall, the second batch of “Perfectly Ripe” pears was found to be softer than the first batch. To counter this batch to batch variation and ensure valid comparison between difference and preference tests, only “Perfectly Ripe” pears that fell within the firmness specifications of 2-4 kg were used in the consumer test (*see Penetrometry section*).

2.2.2 Consumers

Consumers were recruited by an external recruitment agency. In order to qualify, consumers had to purchase pears fortnightly and had to consume pears weekly (minimum two third of the consumers) or fortnightly (maximum one third of the sample size). The recruitment was gender matched for males and females (50:50) and the age of respondents was evenly spread across age categories. Participants with known allergies or intolerances were excluded from the trial. A total of 122 consumers (46% male, 54% female) with a mean age of 38.5 years (std. dev. 14.6 years) completed the test. The average household size of the consumers was 3.5 (std. dev. 1.3) people.

2.2.3 Procedure

Each consumer participated in a single session of around 30 minutes in a Central Location Test setting. Sessions were held on two consecutive days. A first sample (“Ripe and Ready”) was used as a dummy product, (i.e.) evaluated but excluded from the data analysis, to reduce the risk of first-order effects. Consumers then tasted and evaluated three pear samples of different firmness specification. The presentation order was balanced across the respondents and the samples were assessed one at the time. They were asked to rinse their palate between samples. The consumers first assessed the samples on liking and then on the intensity of the attributes sweet, firm, juicy and ripeness. For all ratings, nine point category scales were used with anchors labelled as “very little/very much” or “low/high”. Thereafter the consumers completed a questionnaire that included questions on their pear purchase and consumption habits, as well as a small number of demographic questions.

2.2.4 Data analysis

Data were analysed using SPSS (version 14.0.1, 2006). Repeated measures analysis of variance was carried out to determine whether consumer preferences for pears of the three firmness categories differed. Posthoc testing was carried out using the Bonferroni test. For all analysis, a significance level of $p < 0.05$ was set.

2.2.5 Penetrometry

For the “Ripe & Ready” and the unripened pears the same protocol was used as for the first batch. A different protocol was carried out for the “Perfectly Ripe” pears to reduce the within-batch variability. Penetrometry measurements were carried out just prior to the consumer tests. Each fruit sample from the “Perfectly Ripe” batch was measured on one side of the fruit, and only the fruits that fell within specifications (2-4 kg) were retained and used in the consumer test.

3 Results

3.1 Sensory difference test

3.1.1. Triangle test

The number of correct responses within each triangle is provided in Table 1.

Table 1: Number of correct responses within each of the three triangles.

Triangle comparison of -	Number of correct responses
“Perfectly Ripe” and “Ripe and Ready” pears	7
“Ripe and Ready” and “Unripened” pears	17
“Perfectly Ripe” and “Unripened” pears	22

By chance guessing alone, 33.3% correct responses may be expected (one out of three). In our case of 30 evaluations per triangle, this means that 10 correct responses may be expected by chance guessing alone. With a 5% level of significance, a minimum of 15 correct responses are necessary (Meilgaard et al, 1999).

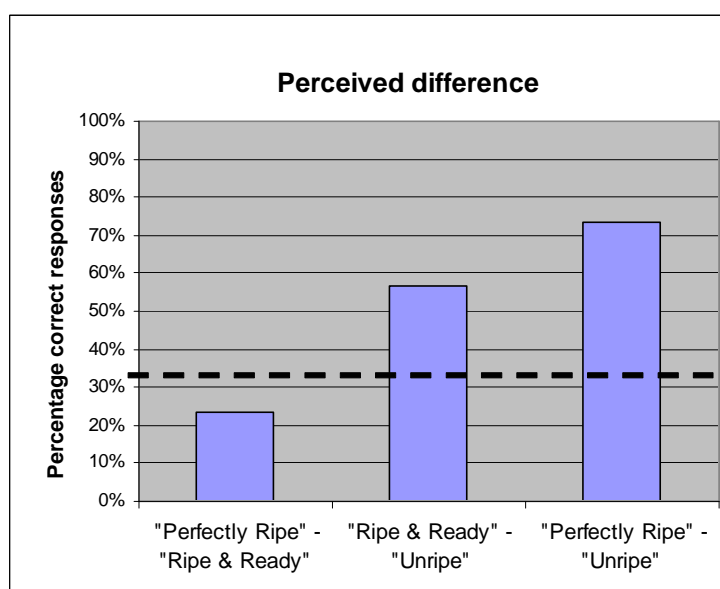


Figure 1: Percentage of correct responses for each of the three comparisons (--- = chance level).

The results of table 1 show that:

- “Perfectly Ripe” pears were not significantly different from “Ripe and Ready” pears
- “Perfectly Ripe” pears were significantly different from “Unripened” pears
- “Ripe and Ready” pears were significantly different from “Unripened” pears

When the consumers used the comments section, they made references to the ripeness, the firmness/softness, the crunchiness, the sweetness or the overall aroma intensity of the samples. References to the pear texture were most common.

3.1.2 Penetrometry measurements

Results from the penetrometry measurements are presented in Figure 2. The results show that “Perfectly Ripe” pears had a high mean score (3.8) and a large standard deviation, meaning that the within-batch variability was high (scores ranged from 1.7 to 7.8). The “Ripe & Ready” pears had a mean score that was only slightly higher (4.3) than the “Perfectly Ripe” pears, and also showed considerable within-batch variability. Unripe pears had a mean hardness of 6.7 and displayed the smallest standard deviation. Despite the small mean difference between “Perfectly Ripe” and “Ripe & Ready” pears, all batches were significantly different from each other.

In addition to the large within-batch variation, there was also within-fruit variation, since the penetrometry measures from the two sides of the fruit differed significantly from one another for all batches. The mean difference was largest for “Perfectly Ripe” pears (1.7) and smaller for “Ripe & Ready” and unripened pears (both 0.4).

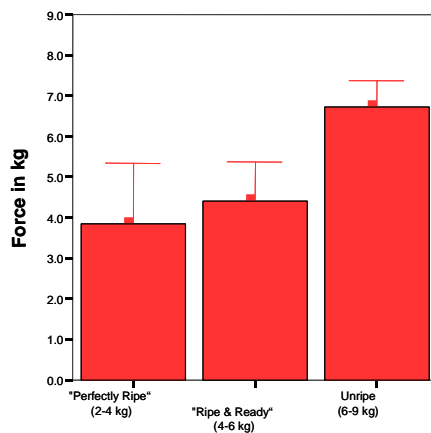


Figure 2: Mean force (in kg) as measured by penetrometry for “Perfectly Ripe”, “Ripe & Ready” and unripened pears (first batch).

3.2 Consumer preferences test

3.2.1 Preferences for pears in three firmness categories

The “Perfectly Ripe” Packham pears were liked more than the “Ripe & Ready” and the “Unripened” Packham pears ($[F2, 240] = 28.0, p < 0.0001$). In addition, “Ripe & Ready” were liked more than the “Unripened” Packham pears (Figure 3).

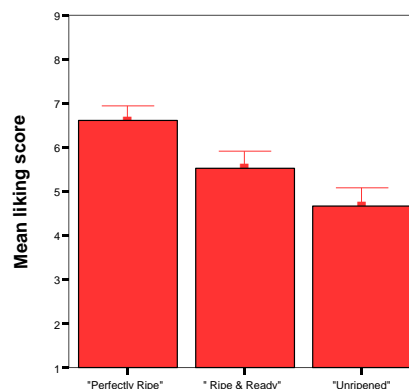


Figure 3: Mean liking (+SE) scores for pears in three firmness categories.

To gain insight into the homogeneity of the responses, histograms with individual results are displayed in Figure 4. The consumers were quite homogeneous in their liking for “Perfectly Ripe” pears in comparison to the “non-ripened” pears which were liked as frequently as they were disliked.

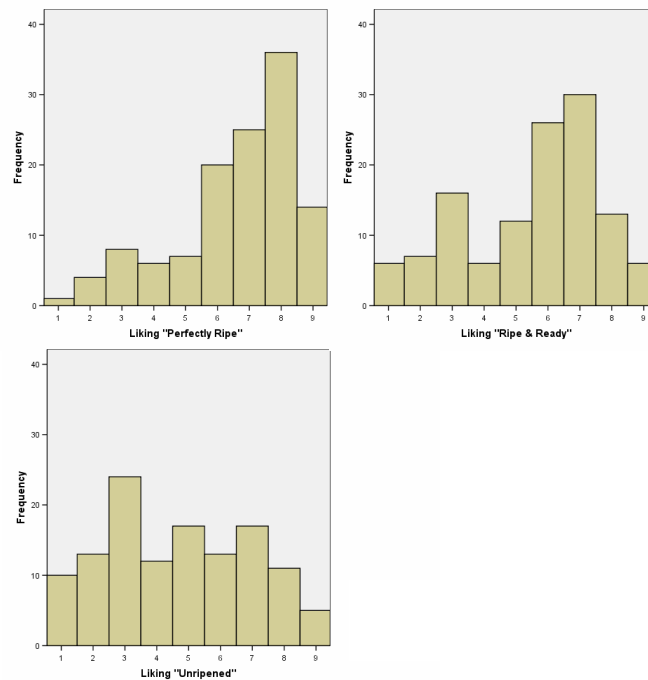


Figure 4: Histograms of preferences for pears in three firmness categories

A second objective was to investigate what proportion of consumers preferred “Perfectly Ripe” and “Ripe & Ready” pears to unripened pears. By subtraction of the two liking scores, 69% of the consumers rated the acceptability of the “Perfectly Ripe” pears as higher than the “unripened pears”. Conversely, 17% of the consumers rated the acceptability of the unripened pears as higher than the “Perfectly Ripe” pears and a further 14% rated acceptability as equal across both firmness categories.

Similarly, 53% of the consumers rated the acceptability of “Ripe & Ready” pears as higher than that for the “unripened pears”, 32% rated the unripened pears more acceptable and a further 15% found both pears to be equally acceptable.

3.2.2 Sensory profile of pears in the three firmness categories

Consumer participants were afforded the opportunity to rate what they perceived were the levels of *sweetness*, *ripeness*, *firmness* and *juiciness* for each of the pear samples. The sensory ratings made by the untrained consumers, is presented in Figure 5. The “Perfectly Ripe” pears had a sensory profile that was distinct from the other samples as they were rated as highest in ripeness, juiciness, sweetness and the least firm. The “Ripe & Ready” pears and “unripened” pears had comparable profiles. “Ripe & Ready” pears were riper, sweeter and juicier and slightly less firm than “unripened pears”.

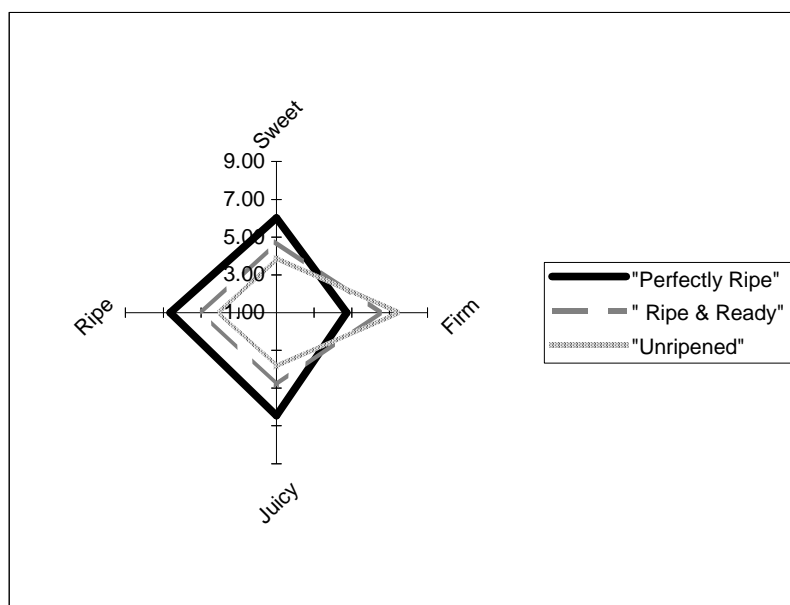


Figure 5: Sensory profile of pears in three firmness categories as rated by the consumers

3.2.3 Pear consumption habits

The consumers that participated in the test had ample experience with Packham pears, with 70% of the consumers eating them at least once a fortnight (Table 2).

Table 2: Consumption frequency of Packham pears

Frequency of consumption	%
Daily/ several times a week	31
Once a week	27
Once a fortnight	22
Once a month	12
Less than once a month	4
Never	3

The majority (79%) of the consumers indicated that Packham pears were the pear variety they consumed most often (Table 3). Eighty-five percent of the consumers consumed more than one pear variety, Corella and Beurre Bosc being the most frequently mentioned.

Table 3: Pear variety consumed most often

Pear Variety Consumed	%
Packham	79
Corella	3
Beurre Bosc	12
Sensation	2
Winter Nelis	2
Nashi	1
Other	2

More than half (57%) of the consumers ate pears at least several times a week, a quarter ate them weekly and 20% ate pears once a fortnight or less (Table 4).

Table 4: Consumption frequency of pears

Frequency of Pear consumption	%
Daily	14
Several times a week	43
Once a week	24
Once a fortnight	11
Less than once a fortnight	9

The majority of consumers (57%) bought pears around once a week (Table 5). Pears were mostly bought at the green grocers and Coles and Woolworths were the most frequently mentioned supermarkets (Table 6).

Table 5: Buying frequency of pears

Buying Frequency	%
Daily/ several times a week	5
Once a week	57
Once a fortnight	25
Less than once a fortnight	8
Never	5

Table 6: Purchase location of pears

Pear Purchase Location	%
Coles	18
Woolworths	24
Franklins	1
Greengrocer	46
Market	5
Other	6

Around a third of the consumers had experience in buying “Perfectly Ripe” or “Ripe & Ready” pears (Table 7), and nearly all consumers had a moderate to definite interest in buying them (Table 8).

Table 7: Have you ever bought pears labelled as “Perfectly Ripe” or “Ripe & Ready”?

<i>Have you ever bought pears labelled as “Perfectly Ripe” or “Ripe & Ready”?</i>	%
Yes, regularly	5
Yes, occasionally	31
No	64

Table 8: Interest in buying “Perfectly Ripe” pears

<i>Would you be interested in buying pears that are “perfectly ripe”?</i>	%
Yes, definite interest	39
Yes, moderate interest	47
No interest	14

3.2.4 Consumer habits with regard to ripeness of pears

Eighty percent of the consumers bought pears in one stage of ripeness, whereas 20% bought them in two stages of ripeness. Similarly, 79% ate pears in one stage of ripeness, whereas 21% ate them in two stages of ripeness. Figure 6 shows that whereas people most often bought pears somewhat ripe or to a lesser extent rather unripe, they ate them either (very) ripe or somewhat ripe.

After purchase, 70% of the consumers stored pears in a fruit bowl until consumption, whereas nearly 30% stored their pears in the fridge.

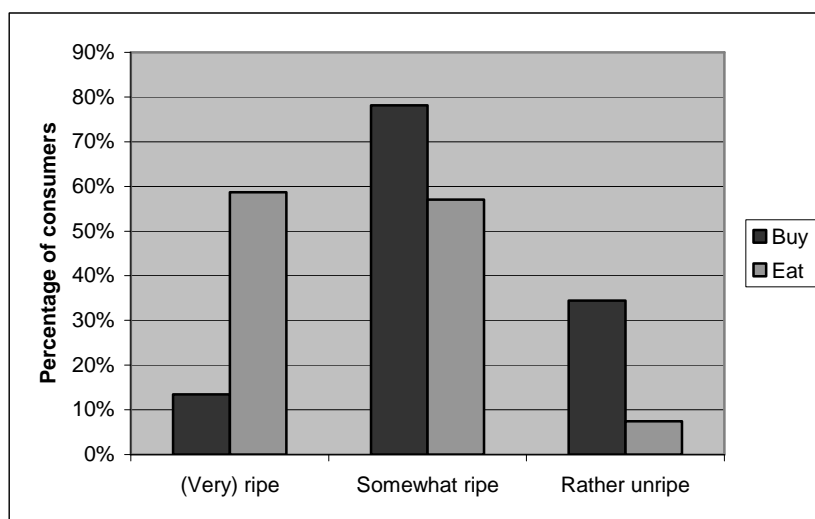


Figure 6: Buying and eating habit with regard to ripeness of pears

3.2.5 Comparison of “Ripe-pear Likers” with the overall group

To gain insight into the differences in usage, interests and socio-demographic profile of consumers who preferred ripe pears to the overall consumer sample, the consumers were grouped according to their preference for “Perfectly Ripe”. Consumers who preferred “Perfectly Ripe” pears to “unripened pears” were analysed as a further subgroup called the “Ripe Pear Likers”.

The “Ripe Pear Likers” have bought pears labelled “Perfectly Ripe” or “Ripe and Ready” slightly more often than the total group (40% versus 36%), and expressed a higher interest in purchasing these types of pears (46% had a definite interest, 47% had a moderate interest and 7% was not interested). The “Ripe Pear Likers” did not differ from the total group with regard to the flesh firmness at the time of purchase, but their consumption habits slightly differed. On average, the same proportion ate pears in the (very) ripe stage, but fewer “Ripe Pear Likers” ate pears when they were rather unripe when compared to the total group (Table 9).

Table 9: Comparison of “Ripe Pear Likers” and total group with regard buying and consumption habits of flesh firmness

	Buy		Eat	
	“Prefer ripe”	Total group	“Prefer ripe”	Total group
(Very) ripe	12%	13%	58%	59%
Somewhat ripe	77%	78%	61%	57%
Rather unripe	30%	34%	2%	7%

The “Ripe Pear Likers” did not differ from the total group with regard to purchase and consumption frequency of pears, gender, household size nor age.

3.2.6. Penetrometry measurements

As a result of a change in protocol for the “Perfectly Ripe” pears (to reduce the within-batch variability), not all pears were used in the consumer test. This “Perfectly Ripe” batch was softer than the first batch; 43% was too soft and 18% had to be discarded due to brown spotting (Table 10).

Table 10: Initial quality of “Perfectly Ripe” pears batch II - received for consumer evaluations

Pears for the consumer trial	%
Discarded due to brown spotting	18%
Too hard (>4 kg)	5%
Too soft (< 2 kg)	43%
Within specification (2-4 kg)	34%

The penetrometry results for the pears used in the consumer test show that the unripened batch was a lot softer compared to the previous batch. Moreover, both the “Ripe & Ready” and the unripened pears were more heterogeneous in firmness, displayed by the large standard deviations (Figure 8). As expected, the standard deviation in the “Perfectly Ripe” pears was largely diminished due the change in the protocol.

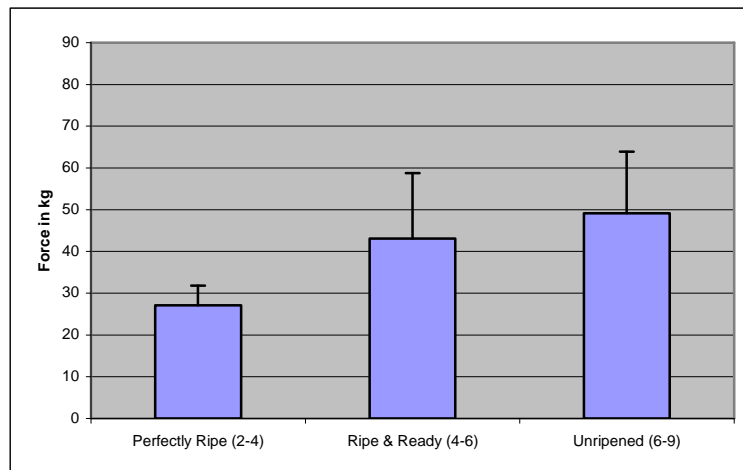


Figure 8 Mean force (kg) as measured by penetrometry for “Perfectly Ripe”, “Ripe & Ready” and “unripe pears” (second batch – for the consumer trial)

4. Conclusions and discussion

There was large within-batch variability for Packham pears and this was most pronounced for the “Perfectly Ripe” pears. Moreover, the between-batch variability of the “Perfectly Ripe” pears also seems to be large as was apparent on comparison of batch 1 and 2. The results of the consumer study refer to “Perfectly Ripe” pears that are within the product specifications, which do not necessarily reflect the product as it is currently sold given the large intra-batch variation observed in the current sample set.

The conclusions of this study are:

Triangle test and Penetrometry measurements

- Based upon the initial received batch, there were no perceptible differences between the “Perfectly Ripe” and the “Ripe & Ready” pears. There were perceptible differences between “Perfectly Ripe” and unripened pears, and between “Ripe & Ready” and unripened pears

Consumer research

- Overall, consumers preferred ripened pears to unripened pears:
 - “Perfectly Ripe” (2-4) and “Ripe & Ready” (4-6) pears were preferred to unripened (6-9) pears
 - “Perfectly Ripe” (2-4) pears were preferred to “Ripe & Ready” (4-6) pears
- “Unripened pears” were liked by a sub-set of the population examined and around 1/3 of consumers preferred the unripened pears
- “Perfectly Ripe” pears were ripest, juiciest, sweetest and least firm, whereas “unripened” pears were the least ripe, the least juicy, the least sweet and the firmest.
- Consumers who preferred the ripened pears consumed fewer pears in the unripened stage, but the same percentage of pears in the (very) ripe stage as compared to the total group.
- Consumers who preferred the riper pears did not differ from the overall group with regard to the stage of ripeness during purchase, but they did express even more interest in pre-ripened concepts.
- Consumers who preferred the riper pears did not differ in demographics from the overall group.

5. Recommendations

Based on consumer sensory preferences, there would appear to be a market for pre-ripened Packham pears. To ensure the success of such concepts, at least two aspects need to be considered.

First, the “Perfectly Ripe” stage of firmness (2-4) is the most preferred. However, it seems to be the category that is hardest to meet the product specifications as pears can ripen differentially over time. In order to further grow the market of Ripe & Ready Packham pears, a reliable, homogeneous product quality that meets with the consumers’ expectations, will be necessary.

Second, this study was primarily aimed at identifying consumer preferences. The study has shown that consumers have an interest in the concept of a pre-ripened pear. However, these concepts may potentially be more expensive to produce which may lead to an increase market price compared to the unripened pears. Therefore it is recommended that further research be conducted to investigate the additional price consumers are willing to pay, before further developing the concept.

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6. References

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