17/04/2013

Shelf Life Evaluation of Econic packaging for Fresh Coffee

Introduction:

Convex Technical team and a coffee blend master and tasting expert have worked together to test Convex's Econic compostable packaging and compare it to the petrochemical barrier film structure currently being used in the market.

Testing:

Convex packed a range of Econic bags with freshly ground coffee. The variety of bags included;

- Standard Econic film with an Avery CO_2 releasing valve,
- Standard Econic with no valve,
- Standard Econic with a seal bar gap valve,
- Matt black outer web Econic with a seal bar gap valve,
- Duplex compostable cello/greensack with a seal bar gap valve
- Paper bag (for initial tests only).

(See table 1 for more information on bag types)

These were compared to a current market example "Jeds" coffee packaging, a matt BOPP/mPET/PE triplex film commonly used in the coffee market.

Packed in these bags were samples of a slow deteriorating medium roast, grade MF, and a faster deteriorating dark roast, grade JS, to be used for the analysis. The different roasts of coffees were used to ensure any differences between packaging were noticed within the time frame of the analysis.

The samples had taste tests conducted after 1, 2, 4, 8, 12, 16, 20 and 24 weeks after packaging the coffee. The taste tests were done by putting 20g of coffee to 200mLs of hot water, scooping the excess coffee out, then slurping and swishing the coffee around our mouths. Each bag was then scored out of 10. The score was based on the aroma, flavour, aftertaste, acidity, body, balance and an overall score. The coffee was compared to freshly ground coffee each time to ensure each test was compared to a premium source made that day.

The coffee samples were also tested for moisture content after 7 months to see if the compostable Econic packaging compared to the traditional packaging.

Description of Bags used							
Sample description	**Option**	**Top Web**	**Vent**	**Films used**	**Renewable – Compostable**	**MVTR* ($g.m^{-2}.24hr^{-1}$)**	**OTR* ($cm^3.m^{-2}.24hr^{-1}$)**
Control	Jeds (control)	Matt	1 way button valve	Petrochemical Triplex	No	1	1
Avery	Silver (3x)	Gloss	1 way Avery valve	Econic Triplex	Yes	5.3	<0.2
Non vented	Silver (3x)	Gloss	None	Econic Triplex	Yes	5.3	<0.2
Vent	Silver (3x)	Gloss	Seal bar gap vent	Econic Triplex	Yes	5.3	<0.2
Matt Black	Black (3x)	Matt	Seal bar gap vent	Econic Triplex	Yes	8.4	<0.2
Duplex	Duplex	Gloss	Seal bar gap vent	Cello/Greensack Duplex	Yes	17.1	<0.2

Table 1: Description of bags and films used

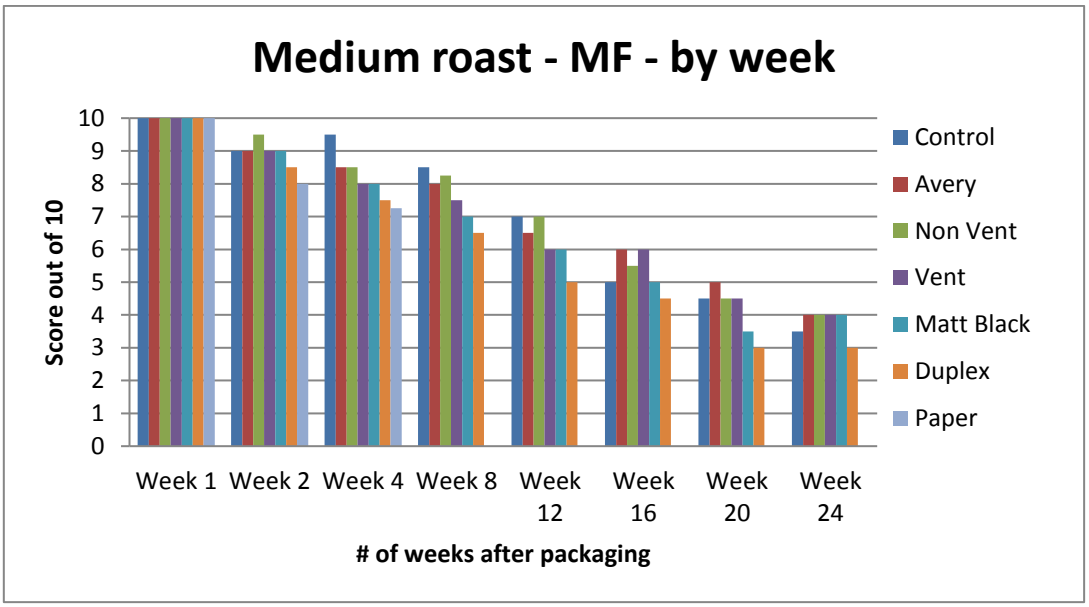
*OTR and MVTR are average values for the film structure only, they do not include the vents.

Picture 1: Lining up the coffee bags ready to get samples.

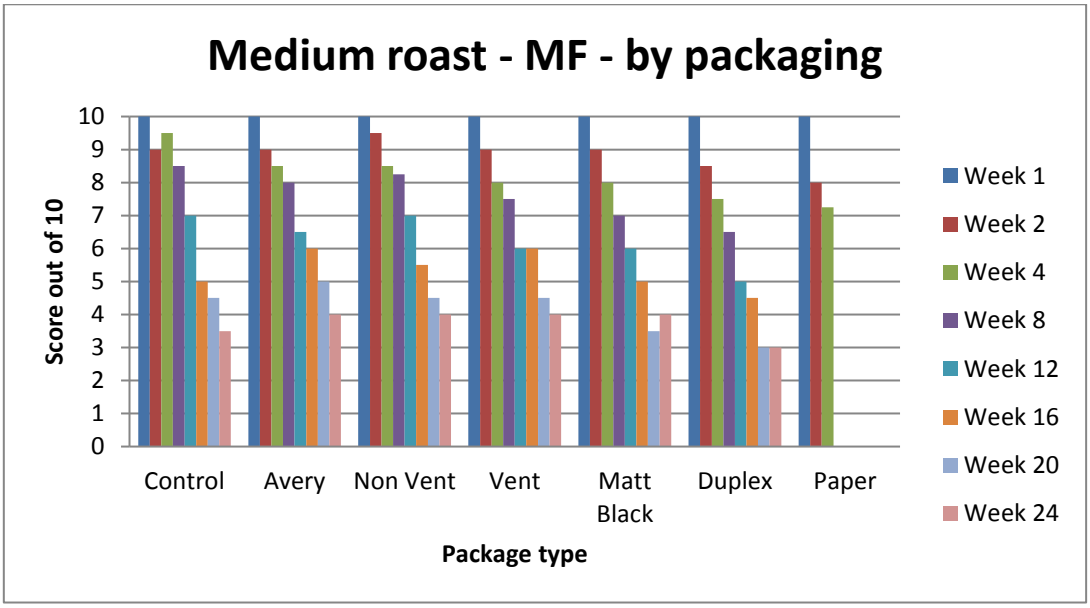
Results:

Medium roast - MF								
Sample	Week 1	Week 2	Week 4	Week 8	Week 12	Week 16	Week 20	Week 24
Control	10	9	9.5	8.5	7	5	4.5	3.5
Avery	10	9	8.5	8	6.5	6	5	4
Non Vent	10	9.5	8.5	8.25	7	5.5	4.5	4
Vent	10	9	8	7.5	6	6	4.5	4
Matt Black	10	9	8	7	6	5	3.5	4
Duplex	10	8.5	7.5	6.5	5	4.5	3	3
Paper	10	8	7.25					

Table 2: Scores for the medium roast (MF) coffee blend in each package over the 24 weeks.



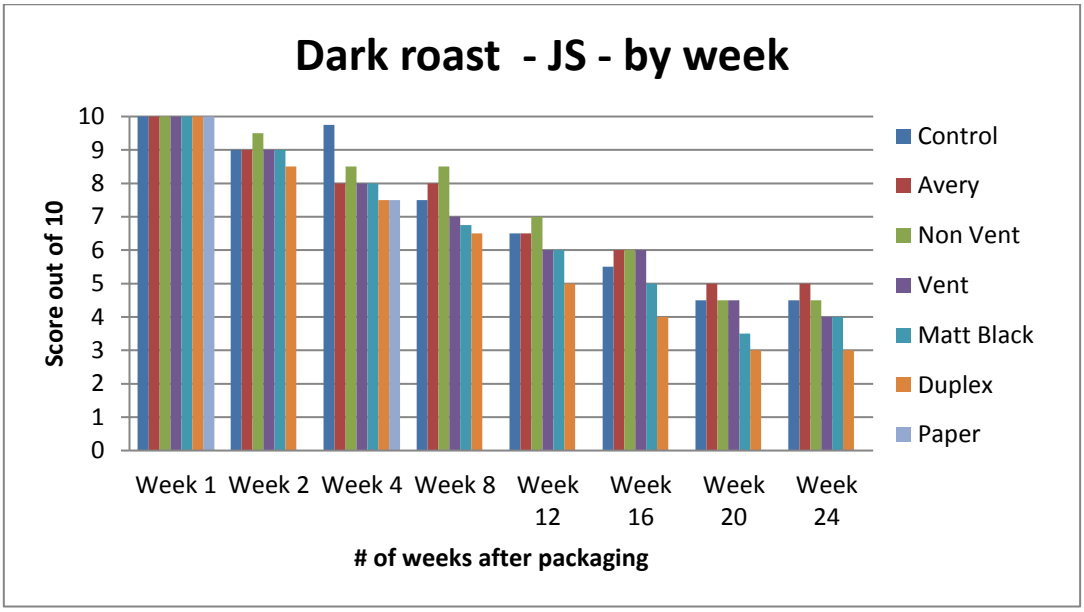
Graph 1: A comparison of the medium roast coffee quality over the weeks



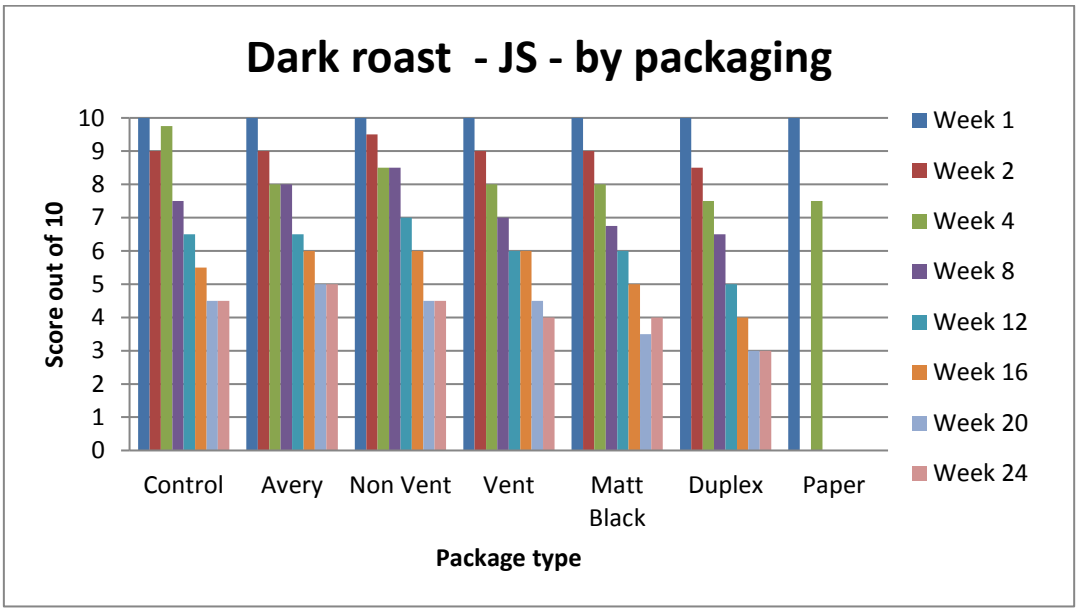
Graph 2: A comparison of the medium roasts coffee quality between the bags over the weeks.

Dark roast - JS								
Sample	Week 1	Week 2	Week 4	Week 8	Week 12	Week 16	Week 20	Week 24
Control	10	9	9.75	7.5	6.5	5.5	4.5	4.5
Avery	10	9	8	8	6.5	6	5	5
Non Vent	10	9.5	8.5	8.5	7	6	4.5	4.5
Vent	10	9	8	7	6	6	4.5	4
Matt Black	10	9	8	6.75	6	5	3.5	4
Duplex	10	8.5	7.5	6.5	5	4	3	3
Paper	10		7.5					

Table 3: Scores for the Dark Roast (JS) coffee blend in each package over the 24 weeks.



Graph 3: A comparison of the dark roast coffee quality over the weeks

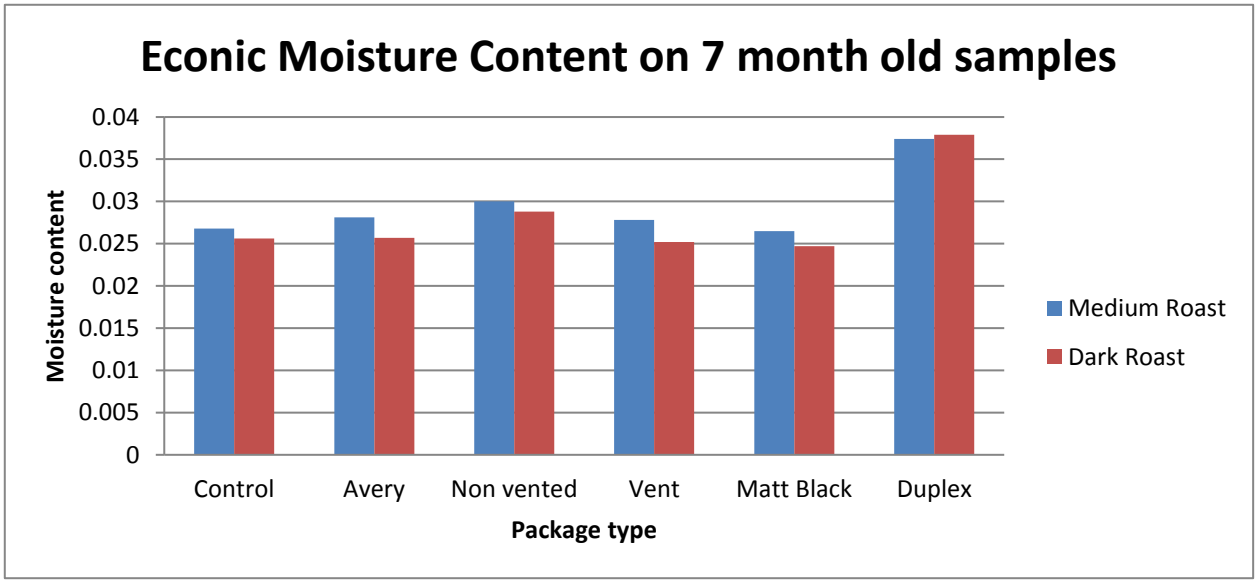


Graph 4: A comparison of the dark roasts coffee quality between the bags over the weeks.

Moisture content on 7 month old samples

Sample description	Medium Roast (MF)	Dark Roast (JS)
Control	2.68%	2.56%
Avery	2.81%	2.57%
Non vented	3.00%	2.88%
Vent	2.78%	2.52%
Matt Black	2.65%	2.47%
Duplex	3.74%	3.79%
Comments		
7-8% = wet coffee		
5 % = maximum "german" standard		
2 - 3.5% = Normal standard result		

Table 4: This table shows the Moisture content values of the coffee blends for each different type of packaging. The three layer film options kept the coffee within an acceptable 'normal' value.



Graph 5: A comparison of the moisture content between the coffee blends and the packaging.

Picture 2: This picture shows the difference in the size of the froth head of a freshly ground coffee compared to the "control" packaged sample that is 6 months old. The bigger froth head height shows the coffee is fresher with more CO_2. It also has more volatile aroma gases being released then trapped within the froth head.

Picture 3: This picture shows the comparison of all the coffee from each different package at 6 months. The Dark Roast generally had a smaller height of froth head compared to the medium roast. This is due to the coffee being roasted for longer it does not have as much CO_2 to release as a medium roast would.

Picture 4: Photo after the tasting had been done. The cups moved closer to the left edge have performed worse than the others.

Discussion:

Both the medium and dark coffee roasts deteriorated at the same rate. The paper structure was added for an extra comparison, but never intended for the full investigation as the structure has poor moisture and oxygen barriers. The paper structure should never be used to package coffee for longer than 2 weeks.

The Duplex structure deteriorated the worst as expected, due to lower moisture barriers. It had a slightly higher than 'normal standard' moisture content result, but was not considered 'wet'. All the other film structures used throughout the investigation kept the coffee at a satisfactory 'normal standard' for moisture.

Both the Avery and non vented bags performed just as good as, or better than the control bag in both coffee roasts. The bags with the seal vents performed just as good as or 5% less than the control.

Freshly ground coffee releases CO_2 gases which can make the bag 'blow up' just after packing, therefore the bags need some sort of vent to release the excess CO_2. The Avery 1 way vent has kept the quality of the coffee at a slightly higher level than the 2 way seal bar gap vents.

The extra head shown in picture 2 on the freshly ground coffee shows it has a strong aroma and flavour. The size of the head decreased faster in the duplex film structure other the weeks than any of the other film structures. The rest of the samples stayed consistent with the control.

Conclusion:

This investigation has shown the compostable Econic structure with an Avery valve is a great alternative to the traditional petrochemical structure. This bag keeps the coffee at similar moisture content levels, and it maintains the aroma, flavour, aftertaste, acidity, body, balance and overall taste at similar or better levels than the petrochemical structure.

Overall, all Econic films performed well against the petrochemical structure currently being used in the coffee market. All of the triplex structures would be suitable renewable, compostable alternatives to maintain the shelf life of packaged coffee. The duplex film is an option for coffee with a high turnover and short shelf life in store.

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