

Fungal contamination of eight precision-chop grass silages on Irish farms

J. Hassett^{1,2}, M. O'Brien^{2,3}, J. McEniry^{2,3} and P. O'Kiely²

*¹School of Food Science and Environmental Health,
Dublin Institute of Technology*

²Teagasc, Grange Beef Research Centre, Dunsany, Co. Meath

³School of Biology and Environmental Science, University College Dublin

Grass silage in Ireland

	<u>Precision-chop</u>	<u>Baled</u>	Sig.
% of total	60	32	√
Dry matter (g/kg)	220	360	***
pH	3.85	4.55	***
Lactic acid (g/kg DM)	103	42	***
WSC (g/kg DM)	11	62	***

Source: McEniry *et al* (2007)

Grass silage in Ireland

	Precision-chop	Baled	Sig.
Log₁₀ cfu/g			
Yeast	2.34	3.81	**
Clostridia	3.04	3.70	*
Bacilli	3.46	2.67	**
Enterobacteria	1.31	1.27	NS
LAB	5.96	5.70	NS

Source: McEniry *et al* (2007)

Fungi on baled silage

- 180 farms ; 360 bales
- Visible fungal growth
 - ~ 90% of bales
 - ~ 6% of bale surface
 - ~ associated with damage to film

Source: O'Brien *et al* (2007)

Mould on baled silage

Mould	% Bales	Colony size (m ²)
<i>Penicillium roqueforti</i>	42	0.13
<i>Schizophyllum commune</i>	21	0.34
<i>Penicillium paneum</i>	5	0.21
<i>Fusarium culmorum</i>	1	0.25
<i>Trichoderma</i>	1	0.19
<i>Coprinus</i>	<1	4.51
Unidentified	3	0.09

Source: O'Brien *et al* (2007)

Yeast on baled silage

Yeast	% Bales	Colony size (m ²)
<i>Pichia fermentans</i>	10	0.19
<i>Geotrichium</i>	4	0.21
<i>Pichia anomala</i>	1	0.05
<i>Candida boidinii</i>	<1	0.14
Unidentified	2	0.98

Source: O'Brien *et al* (2007)

Baled silage – standard of management

	Excellent	Normal
Moulds¹		
<i>Penicillium roqueforti</i>	0	100000
<i>Penicillium paneum</i>	0	46000
Other <i>Pencillium</i>	<10	0
<i>Trichoderma</i>	0	770
<i>Cladosporium</i>	<10	0
<i>Byssochlamys</i>	<10	0
Mucoraceous mould	<10	760
Other moulds	<10	<100

¹Colony-forming units/g silage

Source: M. O'Brien *et al* (2007)

This experiment – precision-chop silage

- 8 different silages
- Precision-chop
- Outdoor, horizontal silos
- Two sheets 0.125mm black polythene
- Sampled during feedout

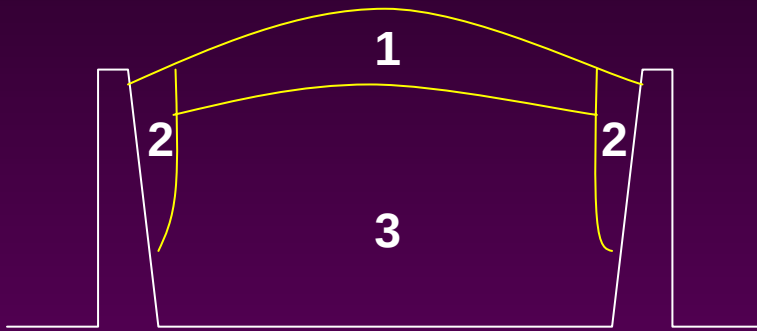
Precision-chop silages

Mean + s.d.

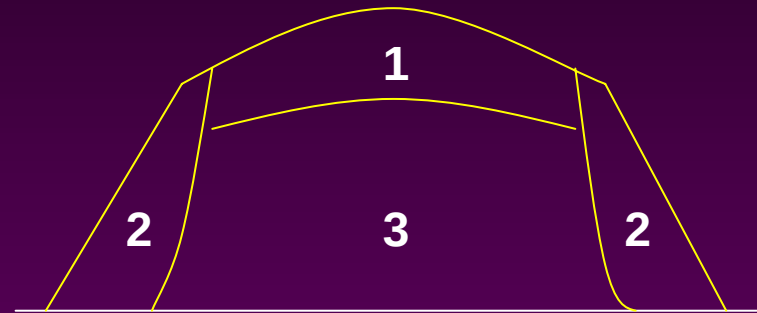
Dry matter (g/kg)	252 (46.1)
-------------------	------------

pH	3.6 (0.13)
----	------------

Sampling



Walled (bunker) silo



Clamp (unwalled) silo

1 = feed face ~ top

2 = feed face ~ sides/corners

3 = feed face ~ centre

4 = core (1m behind face)

Samples

- Duplicate samples/location/silo
- Media

Malt yeast-extract sucrose agar (MYSA) ~ Y + M

Czapek yeast-extract agar (CYA) ~ *P.roqueforti*

Malt extract agar (MEA) ~ *P.roqueforti*

25% glycerol nitrate agar (G25N) ~ *P.roqueforti*

- Microscopy

Fungi on silages

	<u>log₁₀ cfu/g</u>			
	Mean	s.d.	Min.	Max.
Yeast	4.3	0.74	2.9	5.2
Mould	3.3	1.99	0.9	5.5
<i>P. roqueforti</i>	1.2	1.31	0	4.0

Position in silo

	<u>log₁₀ cfu/g</u>				Sig.
	Top	Side	Centre	Core	
Yeast	4.0	3.6	4.8	4.6	NS
Mould	2.2	4.5	2.1	5.5	NS
<i>P. roqueforti</i>	1.8	0.4	0.6	1.1	NS

Conclusions

- Mould and yeast present in all silages examined
- Yeast > mould
- Yeast and mould present in all locations
- *P. roqueforti* on 7/8 silages, mainly side/corners