

# PASTURE SILAGE INOCULANT GUIDE

LOW COST SOLUTIONS TO IMPROVE HOME GROWN FEED



NOTMAN PASTURE SEEDS range of inoculants provide fast, efficient fermentation, but not all inoculants are the same. New generation inoculants from Pioneer provide economic, faster & efficient aerobic stability. With home grown feed more important than ever, take advantage of this low cost solution to improving production.

**REAL FARM VALUE & KNOW HOW  
SINCE 1987**

**NOTMAN**  
PASTURE SEEDS

# NEW GENERATION INOC

Pioneer® Brand Products has been researching and identifying bacterial strains to be used in Silage additives and inoculants since 1978. Over this time Pioneer microbiologists have developed a wide-ranging portfolio of crop specific inoculants.

Pioneer commercialised the first inoculant containing *L. buchneri* in 2000, this was followed in 2003 with the first combination inoculant product 11C33. This original 11C33 product contained crop specific Lactic Acid Bacteria strains combined with *L. buchneri* to deliver rapid pH decline and greatly improve Pit life. In 2016 Pioneer introduced Rapid React technology products which contains a new *L. buchneri* strain that works rapidly to produce stable silage in just 7 days.

A 2009 study conducted in the USA by Huisden et al and published in the Journal of Dairy Science vol. 92 No.2 2009 looked at the Effect of applying molasses or inoculants at two rates on the fermentation and aerobic stability of corn silage and compared two *L. buchneri* containing products Pioneer 11C33 (containing *Lactobacillus plantarum*, *L. buchneri* and *Enterococcus faecium*) and a product containing Lallemand *L. buchneri* 40788 strain and *Pediococcus pentosaceus* 12455 strain with a bare Control and a Molasses treatment.

**“In 2016 Pioneer introduced Rapid React technology products which contains a new *L. buchneri* strain that works rapidly to produce stable silage in just 7 days.”**

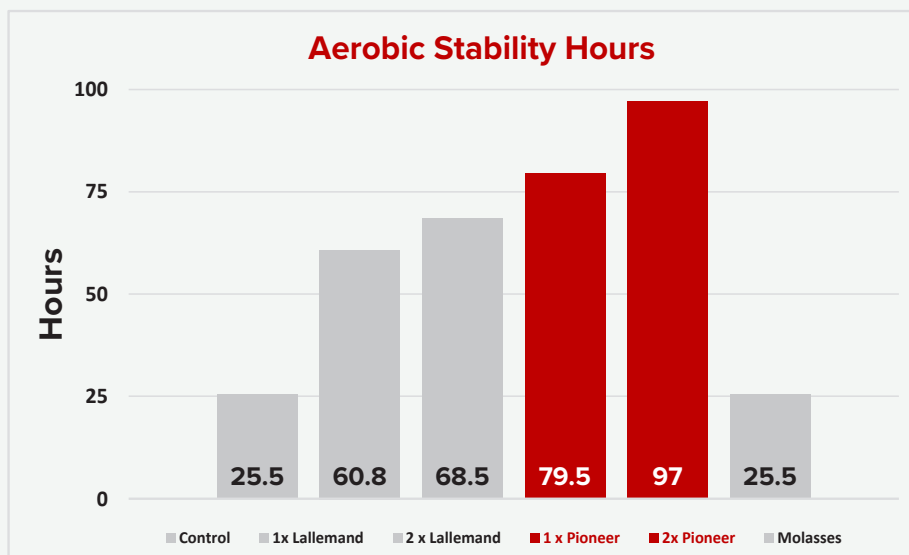
The research concluded that the silage treated with all inoculant-based treatments had a similar pH value, total VFA concentration was higher in Pioneer treated silage compared to Control. Aerobic Stability was best from the Pioneer 11C33 Inoculant

## Microbial Counts and Aerobic Stability

Lactic Acid bacteria counts were unaffected by treatment. However Molasses treated silage had the highest mould counts whilst the Pioneer treatment had the lowest. Yeasts were 25% lower in all Inoculant treatments compared to Control & Molasses treatments, and Pioneer 1x and Pioneer 2x silages had fewer yeasts than Lallemand 1x and Lallemand 2x treatments.

Journal of Dairy Science Vol 92 No 2 American Dairy Science Association

Similar Product	Strain	Tank Life	WT/bottle	Unit Size	CFU	g/WT
LACSIL HC	<i>Lactobacillus buchneri</i> NCIMB 40788 <i>Pediococcus pentosaceus</i>	72 hours	250 WT	700g	2.8g = 400,000g CFU per WT	2.8g/WT
11C33	<i>Lactobacillus buchneri</i> <i>Lactobacillus plantarum</i> <i>Enterococcus faecium</i>	72 hours	250WT	250g	1g = 100,000g CFU per WT	1g/WT



**Fig 1. Aerobic Stability of disturbed silages with different treatments.**

Reference Huisden C. M., A.T. Adesogan, S.C. Kim, T. Osoanya. 2009 Effect of applying molasses or inoculants containing homofermentative or heterofermentative bacteria at two rates on the fermentation and aerobic stability of corn silage. J. Dairy Sci 92:690-697



# INOCULANT FROM PIONEER®

## Research proves;

- Putting more inoculant on over and above the manufacturers specifications especially with the Pioneer product is not necessary
- The amount of applied inoculant and the efficiency of the bacteria to convert the sugars into Lactic Acid Bacteria and hence produce aerobically stable silage varies greatly. As in the study the Lallemand (1x) product was applied at 8mg/kg fresh forage whilst the Pioneer 11C33 (1x) was applied at 1.1mg/kg fresh forage and as shown in Fig 1 the 1x rate of Pioneer 11C33 was stable for longer than both the 1x and 2x rates of the Lallemand product.
- Why the label statement of CFU's or colony forming units is only part of the story it is a mixture of the amount of CFU's in the inoculant and the efficiency of these bacteria to get to work quickly and effectively.
- What other companies use for counts is irrelevant to the strain dosages found in Pioneer® brand inoculants and it can only be assumed that some companies have higher counts because their strains differ in activity than Pioneer strains.

**“Pioneer treated silages had the best aerobic stability with an additional 19-37 hours above the Lallemand products”**

During the study the samples were opened to the air to mimic an open Pit face, Control and Molasses treated silages were only stable for 25 hours whereas inoculant treated silages were stable for an additional 35-71 hours (Fig1). Pioneer treated silages had the best aerobic stability with an additional 19-37 hours above the Lallemand products. This means that the Dairy farmer can have confidence in the Pioneer treated silage to feed out silage feed requirements up to a day in advance with no adverse effects on feed quality. Also, the Pioneer label rate (1x) was stable for 11 hours longer than the double rate (2x) of the Lallemand product. See Fig 1. for aerobic stability findings.

## Our recommendations;

- 11G22 and 11C33 Pioneer Inoculants
- Extremely good value in an agronomy package that will benefit farmers wallet
- Low cost solution to nutrient conservation
- Improves fermentation and reduces dry matter losses
- Improves fiber digestibility
- Available as a water-soluble product in packaging suitable for use in tank mixes or with the Pioneer® Appli-Pro® systems for easy and convenient application.



# TOP INOCULANT QUESTIONS

**Low cost solutions to improving fermentation, aerobic losses and converting silage dollars to milk/beef dollars #realfarmvalue.**

## **NOT ALL INOCULANTS ARE THE SAME**

Inoculants provide fast, efficient fermentation, but not all inoculants are the same. New generation inoculants from Pioneer® provide economic, faster & efficient aerobic stability. With home grown feed more important than ever, take advantage of this low cost solution to improving production.

### **New generation bacteria strains**

The bacteria used in these inoculants are proprietary to Pioneer and are exclusively used in only Pioneer products. No other company has access to these same strains of bacteria. Pioneer commercialised the first inoculant containing *L. buchneri* in 2000, this was followed in 2003 with the first combination inoculant product 11C33. Today Pioneer are using 4th-5th generation strains of *L. buchneri*. So not all *L. buchneri* strains are the same.

### **How does silage inoculant actually work?**

Once the air has been excluded from a silage stack, anaerobic (oxygen-hating) bacteria multiply and convert sugars to acid. This process is known as silage fermentation and the acid preserves the plant material as silage. All crops contain a range of bacteria that differ in the efficiency with which they convert sugar to acid and the type of acid they produce. The most efficient bacteria produce high levels of lactic acid. A quality silage inoculant contains crop specific strains of the most efficient lactic acid producing bacteria, added to the crop at harvest time to produce high quality fermentation.

### **What organisms should be present in a silage inoculant?**

An inoculant may contain one or more strains of lactic acid bacteria. The most common homofermentative species is *Lactobacillus plantarum*. Other common homofermentative species include various *Lactobacillus* or *Pediococcus* species and *Enterococcus faecium*. *Lactobacillus buchneri* is the heterofermentative species used to improve aerobic stability. Be skeptical of products containing other species.

### **Why shouldn't I apply the cheapest product?**

Silage inoculants appear similar simply because they contain the same genus/species information on the label (eg *Lactobacillus buchneri*). However just like two cows differ in the efficiency in converting grass to milk, bacteria differ in their ability to improve silage fermentation quality. Most cheap products are derived from a buying strategy of sourcing lowest-cost old generation bacterial strains, lack quality standards and label bacterial count guarantees.

### **What is L.Buchneri?**

Pioneer Rapid React® 11C33 & 11G22 inoculant contains a proprietary *L. buchneri* strain to significantly improve bunklife and reduce aerobic losses at feed-out. Discovered in 1921, *Lactobacillus buchneri* is a heterofermentative bacteria that produces lactic acid and acetic acid during fermentation. It is used as a bacterial inoculant to improve the aerobic stability of silage. These bacteria are inoculated and used for preventing heating and spoilage after exposure to air.

### **New technology vs Bacteria counts (cfu/g)**

What other companies use for counts is irrelevant to the strain dosages found in Pioneer® brand inoculants. It can only be assumed that some companies have higher counts because their strains differ in activity than Pioneer strains. Pioneer microbiologists work to ensure that the bacteria that is in a Pioneer inoculant is the best it can be. Bacterial strains in silage will multiply until they achieve a population of about 1 billion cfu/gram of forage and they seldom exceed that population count. It's the effectiveness of the *buchneri* strain that counts.

### **Inoculant and types of additives**

Silage additives can be classified into five groups based on their mode of action:

- Fermentation stimulants (inoculants): promote the desired lactic acid fermentation
- Fermentation inhibitors: directly acidify or sterilise the silage, inhibiting growth of undesirable organisms.
- Aerobic spoilage inhibitors: designed to improve aerobic stability
- Nutrients: added to improve the nutrient value of the silage
- Absorbents: used to prevent effluent loss by raising the DM content of the silage and/or by absorbing moisture.

# RAPID REACT™

WITH AEROBIC STABILITY TECHNOLOGY

# SO FAST

## IT CAN KEEP UP WITH YOU

# READY TO FEED IN JUST 7 DAYS

Pioneer® brand inoculants 11C33 and 11G22 with Rapid React® aerobic stability\* technology are a breakthrough advancement in Integrated Feed Solutions providing stable feed in just seven days. And like all Pioneer brand inoculants, they can help maximize the value of your feed.

### Achieve aerobic stability quick

Rapid React aerobic stability technology contains a special patented strain of bacteria which quickly goes into action and makes your feed ready in just seven days. Unlike other inoculants with bacteria that takes up to 60 days to convert

The benefits of this new technology include:

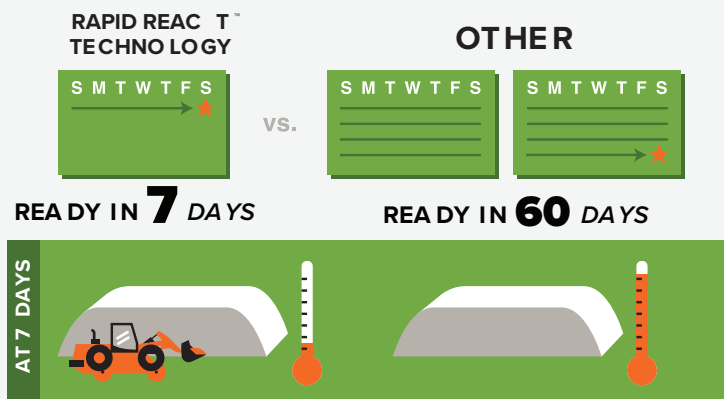
- Faster access to your most valuable input
- A consistently cool silage pit face
- And an extended silage pit life

### Make the most of your feed

Rapid React aerobic stability technology with Lactobacillus buchneri allows you to get more out of every day and every ton by working to:

- Increase fermentation efficiency
- Minimize dry matter loss
- Reduce spoilage on the top and tails of the silage bunker or pile
- Produce consistently pleasant tasting feed

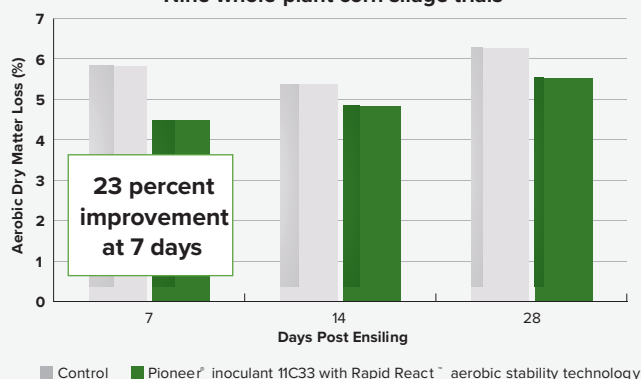
### RAPID REACT AEROBIC STABILITY TECHNOLOGY



### AEROBIC DRY MATTER LOSSES

PIONEER INOCULANT 11C33 WITH NEW RAPID REACT AEROBIC STABILITY TECHNOLOGY

Nine whole-plant corn silage trials



# 11G22 GRASS SILAGE INOCULANT

LUCERNE / GRASS / CEREAL / SILAGE INOCULANT

**Rapid React® aerobic technology - stable feed in 7 days**

**Improves fiber digestibility**

**Improves nutrient conservation**

**Significantly reduces heating on bunker/pile face**

**Improves fermentation and reduces dry matter loss**

Available in



**Pioneer® brand 11G22 is a lucerne/grass/cereal silage inoculant with next-generation *L. buchneri* designed to:**

- Enhance fermentation in grass and whole plant cereal silage and deliver improved fermentation and a fermentation acid profile that minimizes aerobic dry matter losses
- Be used in grass and whole plant cereals ensiled at the proper maturity in upright, bunker or bag silos and at a dry matter between 30% and 42%

Available as a water-soluble product in packaging suitable for use in tank mixes or with the Pioneer® Appli-Pro® systems for easy and convenient application.

**11G22 contains a unique blend of patented and/or proprietary strains of *Lactobacillus buchneri* and *Lactobacillus plantarum* formulated to:**

- Improve silage quality providing low terminal pH and desirable VFA profile for decreased fermentation loss and enhanced aerobic stability
- Improve animal performance

**Includes Rapid React® aerobic stability technology. This provides improved bunklife and stable feed in 7 days.\***

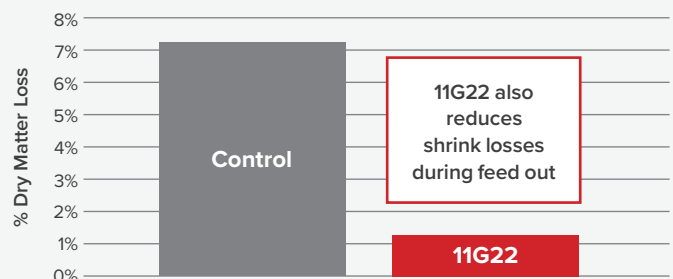
- Rapid React aerobic stability technology contains a special patented strain of bacteria which quickly goes into action and makes your feed ready in just seven days. Unlike other inoculants with bacteria that takes up to 60 days to convert.
- Faster access to your most valuable input
- A consistently cool silage pit face
- And an extended silage pit life

## pH and Aerobic Stability Trials

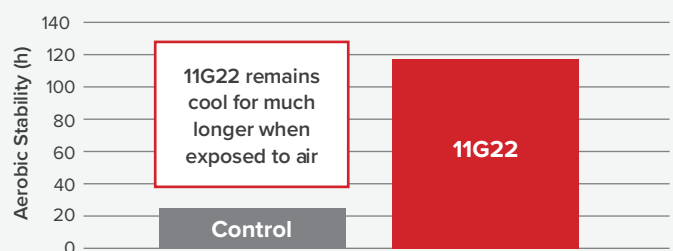
Inoculated and Untreated Grass Silage

Item <sup>1,2</sup>	Control	11G22
DM, %	39.55	40.03
pH	4.83	4.86
DM recovery, %	89.51 <sup>a</sup>	92.84 <sup>b</sup>
Aerobic stability, hours	25.50 <sup>a</sup>	116.25 <sup>b</sup>
DM loss, %	4.37% <sup>b</sup>	1.07% <sup>a</sup>

## Shrink Loss in Grass Silage



## Grass Silage Effects on Bunklife When Subjected to Air



Source: Pioneer Livestock Nutrition Center, Iowa. Summary of two trials. Dry matter recovery, aerobic stability, and nutrient composition were determined for uninoculated (Control) corn silage and for corn silage inoculated with Pioneer® brand 11G22 Corn Silage Inoculant (11G22).

<sup>1</sup> All values are expressed as least squares means.

<sup>2</sup> Dry matter loss as measured during the aerobic stability test.

<sup>a,b</sup> Treatment means in same row without a common superscript letter differ (P < .05).

# RAPID REACT™

WITH AEROBIC STABILITY TECHNOLOGY



# 1174 GRASS SILAGE INOCULANT

## PASTURE SPECIFIC BACTERIA

Improve silage digestibility

Increase dry matter recovery

Promote a faster, more efficient fermentation

Increase animal performance

Proven multi crop inoculant

Available in



### Improved Fermentation, Nutrient Retention and Digestibility

Pioneer® brand 1174 silage inoculant is designed to help improve fermentation, retain nutrient content and enhance digestibility in ensiled forages.

### Improved Forage Quality

1174 contains a unique blend of patented and/or proprietary strains of *Lactobacillus plantarum* and *Enterococcus faecium* formulated to improve forage quality for silage with higher energy, ferment forage faster to retain more energy and reduce dry matter losses. 1174 contains live lactic acid-producing bacteria that have been specifically selected to assist in the production of high quality silage.

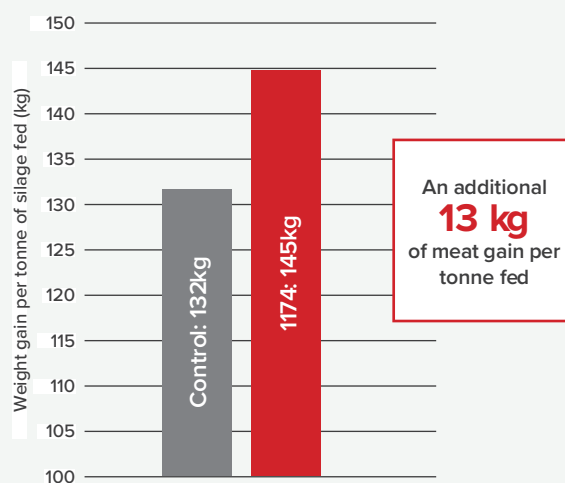
### More Pounds of Milk per Ton

1174 silage inoculant produces 103 more pounds of milk per ton of grass/legume silage and 69 more pounds of milk per ton of corn silage fed to dairy cows.

Available as a water-soluble product in packaging suitable for use in tank mixes or with the Pioneer Appli-Pro® Application Systems or as a free-flowing granular formulation for easy and convenient application. All products are available in two bottle sizes, 50WT and 250WT.

**Water Soluble:** 40G/50T (IAU5), 200G/250T (IAU7)

### Australian Beef Feeding Trial



Australian beef feeding trial conducted at NSW Agriculture's Research Centre at Wagga Wagga. An extra 13kg of beef per tonne of maize silage fed when treated with 1174 compared to untreated. Kaiser and Piltz 1998.





*Australian owned & operated since 1987*

# NOTMAN PASTURE SEEDS

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Improved aerobic stability and reduced heating is relative to untreated silage. Actual results may vary. The effect of any silage inoculant is dependent upon management at harvest, storage and feedout. Factors such as moisture, maturity, chop length and compaction will determine inoculant efficacy. Pioneer® brand products are provided subject to the terms and conditions of purchase which are part of the labelling documents. ®, TM, SM Trademarks and service marks of DuPont, Dow AgroSciences or Pioneer, and their affiliated companies or their respective owners. © 2018 GenTech Seeds Pty Ltd. No part of this publication can be reproduced without prior written consent from GenTech Seeds Pty Ltd.