COMPACT TMR – FOR IMPROVED FEED EFFICIENCY

Niels Bastian Kristensen

Webinar
17 January 2017
CONTENTS

- Definition of the Compact TMR concept
- Compact TMR mixing process
- Monitoring feed mixers and adjust feed mixers to the Compact TMR challenge
- Feed bunk management and behavior of cows at the feed bunk
- Effects of Compact TMR on production and efficiency
THE COMPACT TMR CONCEPT

The formulated ration for the entire herd 24 x 7

- Orts minimum 2% (1 kg/cow)
- Compact TMR
PHYSICAL CHARACTERISTICS OF COMPACT TMR

- Mix with grass silage, grass is the skeleton of the mix
- Grass chunks/balls have to be mixed away
  - (impact of chop length)
- All feedstuffs have “disappeared”
- No pellets or small particles on the floor or in the feed
- Moist and adhering mix
- Homogenous and short “skeleton”
**THE STANDARD COMPACT TMR PROTOCOL**
**VERTICAL AND HORIZONTAL AUGER MIXERS**

<table>
<thead>
<tr>
<th>Mix phase</th>
<th>Ingredients</th>
<th>Time</th>
<th>Dry matter of mix:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I SOAKING</strong></td>
<td>Pelleted feedstuffs and commodities + Water 1:1</td>
<td>+1 hour Typically over night soaking</td>
<td>Vertical auger 36%</td>
</tr>
<tr>
<td><strong>II STRUCTURING</strong></td>
<td>Mineral premix, grass silage, other fibrous feedstuffs</td>
<td>Mixing time 15-20 min</td>
<td>Horizontal auger 39%</td>
</tr>
<tr>
<td><strong>III FINISHING</strong></td>
<td>Corn silage</td>
<td>Mixing time 15-20 min</td>
<td></td>
</tr>
</tbody>
</table>
ADDING WATER +/- ACID

Be prepared for a warm summer with acid on stock.

1. 
2. 
3. 
4.
DON’T ADD WATER TO MIXER ON HOLD
RUN MIXER WHILE ADDING WATER
**WHEN ADDING WATER, ADDING TOO LITTLE, IS VERY DANGEROUS**

<table>
<thead>
<tr>
<th>Water added to mix, kg / cow</th>
<th>8</th>
<th>12</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein, g/kg DM</td>
<td>170</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Dry matter in PMR, g/kg</td>
<td>350</td>
<td>375</td>
<td>400</td>
</tr>
</tbody>
</table>

Representative sample obtained using coning and quartering, PMR
Chunks of feed from pile

Adding too much water is far less dangerous - just making the feed wet.
WITH GRASS + MAIZE RATIONS OVER-MIXING IS NOT A CONCERN – ONLY UNDER MIXING

1X TMR
Soaking over night
Structuring 20 min
Finishing 45 min

CORMALL MIXER

3X TMR
Soaking over night
Structuring 20 min
Finishing 45 min
Extra mixing 90 min
THE COMBINATION OF PHASE II AND PHASE III MIXING ENSURES AN EFFECTIVE STEPWISE BLENDING

REMEMBER TO CONTINUE TO MIX LONG ENOUGH TO ENSURE A COMPLETELY UNIFORM AN NON-SEPARABLE PRODUCT

Mixing time for finishing phase should be 15 to 20 min with vertical auger mixers

Always 20 min with horizontal auger mixers
PROTECT MIXER AND TRACTOR
DON’T STOP MIXER BEFORE UNLOADING

Use wide-angle PTO shaft
BE AWARE OF CARRY OVER IN MIXER

DRY COW RATIONS AEROBIC STABILITY

Problem depends on auger design and max speed of auger during unload
Restrictor plates are to be used when cutting straw.

Don’t use restrictor plates when mixing Compact TMR for lactating cows, you risk to block the flow in the mixer.
MONITORING FEED MIXERS AND ADJUST FEED MIXERS TO THE COMPACT TMR CHALLENGE
"FROZEN" MIX = DANGEROUS
THE COMMON PROBLEM WITH VERTICAL AUGER MIXERS
PROBLEM SOLVERS
SIMPLE, BUT ABSOLUTELY CRITICAL
NOW THE MIXER IS MIXING
IN PRACTICE, MAINTENANCE IS SOME TIMES “FORGOTTEN” – THE MIXER LOOSES IMPACT
FEED BUNK MANAGEMENT AND BEHAVIOR OF COWS AT THE FEED BUNK
MANY ASSUMED TMR’S HAVE NEVER BEEN MIXED PROPERLY
UNDER MIXED RATIONS INDUCE SORTING BEHAVIOR
COWS ATTRACTED BY SORTING POSSIBILITY AND REMAIN AT FEED BUNK DUE TO LONG EATING TIME
LEFT OVERS (ORTS) ARE CRITICAL TO CONTROL COW BEHAVIOR

Orts outside the reach of cows are only waste.

Minimum 2% orts evenly distributed along the feed bunk is a requirement in the Compact TMR concept.
THIS IS THE BEHAVIOR YOU AIM FOR

Cows remains laying in stalls

Fresh mix
COWS RESPOND IMMEDIATELY TO MIXING QUALITY — EXAMPLE FIRST COMPACT TMR FEEDING IN HERD
FEED BUNK MANAGEMENT AFFECT BEHAVIOR

Proportion of milking cows at feed bunk

Time

00:00:00 04:00:00 08:00:00 12:00:00 16:00:00 20:00:00 00:00:00

0,0 0,1 0,2 0,3 0,4 0,5 0,6
YOUR COWS DON’T LIE
CONTINUE TO OBSERVE THE BEHAVIOR AT AND AROUND THE FEED BUNK TO EVALUATE THE MIXING QUALITY

• Cows are eating from the top of the pile, not on the floor!
• Feed stays in the pile
• No reaction (minimum) from cows during feed out
• No reaction (minimum) from cows when pushing up feed
• Orts and feed mix identical upon inspection
3 CRITERIA TO EVALUATE BEFORE YOU CAN MAKE ANY JUDGEMENT ON IMPLEMENTATION OF COMPACT TMR

1. Evaluate the feed mix
2. Evaluate the behavior of the cows
3. Evaluate the flow in the mixer
EFFECTS OF COMPACT TMR ON PRODUCTION AND FEED EFFICIENCY
FARM LEVEL SHORT PERIOD

Relative ECM yield, % of predicted

Before

With Compact TMR

Short term trials with approx. 1 month treatment periods

n = 11, P < 0,01
FARM LEVEL + 2 YEARS

Relative ECM yield

<table>
<thead>
<tr>
<th>Half year</th>
<th>2012 / 1</th>
<th>2012 / 2</th>
<th>2013 / 1</th>
<th>2013 / 2</th>
<th>2014 / 1</th>
<th>2014 / 2</th>
<th>2015 / 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.90</td>
<td>0.95</td>
<td>1.00</td>
<td>1.05</td>
<td>1.10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dedicated Compact TMR farms

Reference group mixed implementation of Compact TMR
NATIONAL LEVEL
MILK PRODUCTION BY DANISH HOLSTEIN

Milk recording year
8/9 9/10 10/11 11/12 12/13 13/14 14/15
Milk fat + protein, kg/year
650 700 750 800 850
Milk yield, kg milk/year
9000 9500 10000 10500 11000
Compact TMR
FEED EFFICIENCY
(NORFOR NEL-EFFICIENCY)

P < 0.10
Korrigeret for tørstof i TMR/PMR

Before  With Compact TMR
LONG TERM PERSPECTIVE

The Compact TMR Analyzer (CTA) is closing the big nutritional loop in dairy production.

Feed MIX = Ingested ration = Analysis

Compact TMR/PMR
This project has received funding from the European Union’s Horizon 2020 research and innovation programme (ISIB-2015-1 programme) under grant agreement No 696364