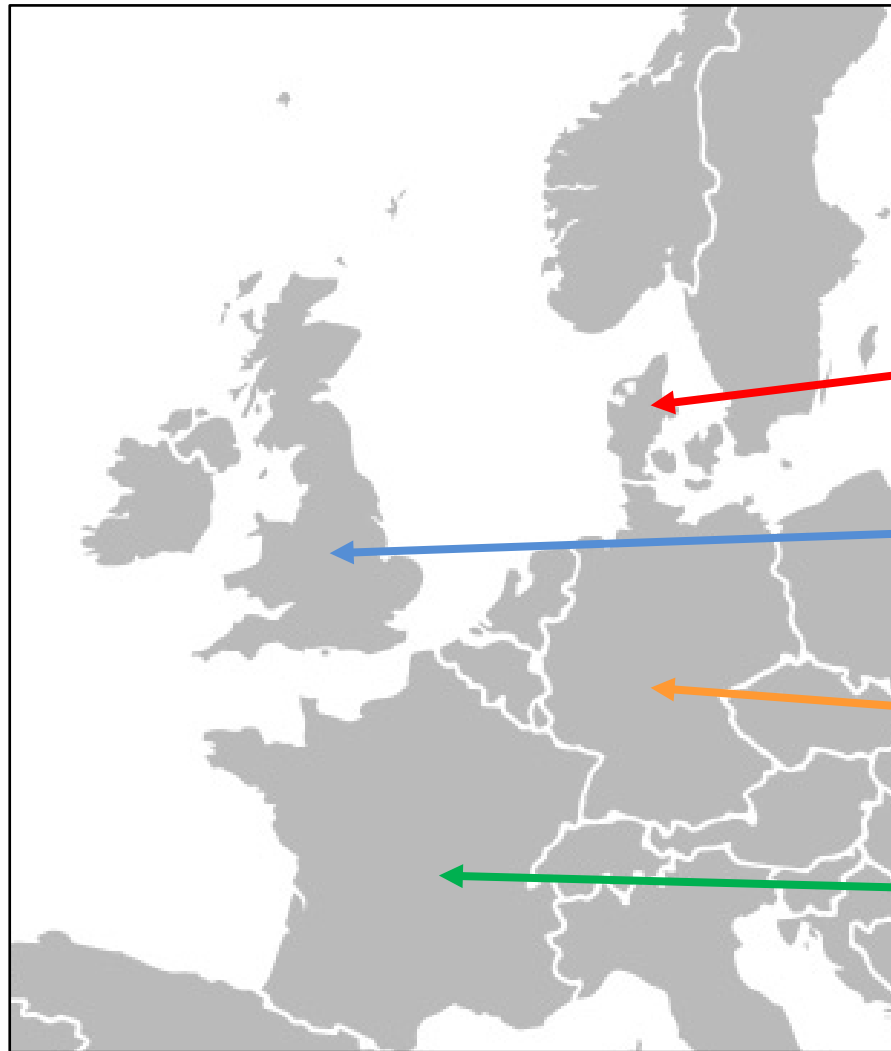


# European bread wheat standards - a breeder's challenge

*Finn Borum  
Wheat breeder  
Sejet Plantbreeding*





Denmark 0.6 mill. Ha

England 2 mill. Ha

Germany 3 mill. Ha

France 5 mill. Ha



# DK BREAD MAKING VARIETIES

VARIETY
Creator
Dante
Ellvis
Genius
Heroldo (w)
JB Asano
Jensen
KWS Dacanto
KWS Esko
KWS Montana
Pistoria
Skagen
Tuareg
Ure



# LIST OF DK BREAD MAKING VARIETIES

VARIETY	DK SEED PROD 2016 (t)
Creator	800
Dante	0
Ellvis	0
Genius	0
Heroldo (w)	86
JB Asano	0
Jensen	1040
KWS Dacanto	4000
KWS Esko	0
KWS Montana	13
Pistoria	6300
Skagen	45
Tuareg	0
Ure	0
Total Bread	12284
Total market	73414

**DK USE FOR MILLING  
330.000 t**

**DK TOTAL WHEAT PRODUCTION  
5.000.000 t**



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330.000 t**

**DK TOTAL WHEAT PRODUCTION  
5.000.000 t**

**KWS Lili**

**2475**



## In the past:

1. Variety suitable for Intervention
2. Bread volume 85 % of ref. variety Hereward

Zeleny sedimentation 85 % of ref. variety Hereward

Non sticky dough

## In the future:

1. Variety suitable for Intervention
2. Bread volume 90 % of average of listed varieties

Zeleny sedimentation 90 % of average of listed varieties

Non sticky dough



## In the past:

1. Variety suitable for Intervention
2. Bread volume 85 % of ref. variety Hereward

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Non sticky dough

## In the future:

1. Variety suitable for Intervention
2. Bread volume 90 % of average of listed varieties



Zeleny sedimentation 90 % of average of listed varieties

Non sticky dough

Quality, variety listing: TGW, specific weight, flour yield, protein%, falling no, Zeleny sedi, water absorption, farinograph, dough surface, RMT bread volume, bread height, bread structure.





# GERMAN BREAD WHEAT STANDARDS

QUALITY GROUP		
E	Elite weizen	Premium quality bread weheat
A	Qualitätsweizen	Bread wheat
B	Brotweizen	Milling wheat
C	Sonstiger weizen	Feed wheat
C <sub>k</sub>	Keksweizen	Biscuit wheat





# GERMAN BREAD WHEAT STANDARDS

QUALITY GROUP			MULTIPLICATION	MARKET
			AREA Ha	SHARE %
E	Elite weizen	Premium quality bread weheat	4467	<b>10</b>
A	Qualitätsweizen	Bread wheat	20443	<b>44</b>
B	Brotweizen	Milling wheat	15747	<b>34</b>
C	Sonstiger weizen	Feed wheat	5343	<b>12</b>
C <sub>k</sub>	Keksweizen	Biscuit wheat	321	<b>&lt;1</b>



QUALITY GROUP		MARKET SHARE %
E	Elite weizen	<b>10</b>
A	Qualitätsweizen	<b>44</b>
B	Brotweizen	<b>34</b>
C	Sonstiger weizen	<b>12</b>
C <sub>k</sub>	Keksweizen	<b>&lt;1</b>

## DOUGH PREPARATION



Rapid mix test

## BREAD TYPE : "Brötchen"



## Properties:

Indirect quality parameters :

FALING NUMBER

FALLING NUMBER STABILITY

PROTEIN CONTENT

ZELENY ZEDIMENTATION

DEGREE OF FINENESS

WATER ABSOBTION

Milling parameters :

MINERALSTOFFWERTZAHL

FOLUR YIELD Type 550

Baking parameters :

BREAD VOLUME

DOUGH ELASTICITY

DOUGH SURFACE

## Test material:

WP1

8 locatations

WP2

8 locations

WP3

8 locations



SCORE		FALING NUMBER	PROTEIN CONTENT
		Diff. to Julius	Julius = 100
1	Sehr niedrig	< -188	<92,8
2	Sehr niedrig bis niedrig	-188 to -159	92,8 - 95,5
3	Niedrig	-158 to -129	95,6 - 98,3
4	Niedrig bis mittel	-128 to -99	<b>98,8 - 101,1</b>
5	Mittel	-98 to -69	101,2 - 103,9
6	Mittel bis hoch	-68 to -39	104,0 - 106,7
7	Hoch	-38 to -9	106,8 - 109,5
8	Hoch bis sehr hoch	<b>-8 to +21</b>	109,6 - 112,3
9	Sehr hoch	> +21	> 112,3



QUALITY GROUP	<b>E - Group</b>	<b>A - Group</b>	<b>B - Group</b>	<b>C - Group</b>
<b>PROPERTIES</b>	Elite-Weizen	Qualitäts-Weizen	Brot-Weizen	sonstiger Weizen
<b>BREAD VOLUME (RMT)</b>	<b>&gt;= 8</b>	<b>&gt;= 6</b>	<b>&gt;= 4</b>	-
FALING NUMBER	>= 6	>= 5	>= 4	-
PROTEIN CONTENT	>= 6	>= 4	>= 2	-
ZELNY SEDIMENTATION	>= 7	>= 5	>= 3	-
WATER ABSOBTION	>= 4	>= 3	>= 2	-
FLOUR YIELD	>= 5	>= 5	>= 4	-
etc..				



QUALITY GROUP	<b>E - Group</b>	<b>A - Group</b>	<b>B - Group</b>	<b>C - Group</b>
<b>PROPERTIES</b>	Elite-Weizen	Qualitäts-Weizen	Brot-Weizen	sonstiger Weizen
<b>BREAD VOLUME (RMT)</b>	<b>&gt;= 8</b>	<b>&gt;= 6</b> <small>SHERIFF 5</small>	<b>&gt;= 4</b>	-
FALING NUMBER	>= 6	>= 5	>= 4	-
PROTEIN CONTENT	>= 6	>= 4	>= 2 <small>SHERIFF 1,99</small>	-
ZELENY SEDIMENTATION	>= 7	>= 5	>= 3	-
WATER ABSOBTION	>= 4	>= 3	>= 2	-
FLOUR YIELD	>= 5	>= 5	>= 4	-
etc..				



QUALITY GROUP	<b>E - Group</b>	<b>A - Group</b>	<b>B - Group</b>	<b>C - Group</b>
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PROTEIN CONTENT	>= 6	>= 4	>= 2 <small>SHERIFF 1,99</small>	-
ZELENY SEDIMENTATION	>= 7	>= 5	>= 3	
WATER ABSOBTION	>= 4	>= 3	>= 2	
FLOUR YIELD	>= 5	>= 5	>= 4	
etc..				





QUALITY GROUP	E - Group	A - Group	B - Group	C - Group
PROPERTIES	Elite-Weizen	Qualitäts-Weizen	Brot-Weizen	sonstiger Weizen
BREAD VOLUME (RMT)	$\geq 8$	$\geq 6$	BENCHMARK 4 $\geq 4$	-
FALING NUMBER	$\geq 6$	$\geq 5$	$\geq 4$	-
PROTEIN CONTENT	$\geq 6$	$\geq 4$	BENCHMARK 2,01 $\geq 2$	-
ZELNY SEDIMENTATION	$\geq 7$	$\geq 5$	$\geq -$	-
WATER ABSOBTION	$\geq 4$	$\geq 3$	$\geq -$	-
FLOUR YIELD	$\geq 5$	$\geq 5$	$\geq -$	-
etc..				





# GERMAN BREAD WHEAT STANDARDS

B-VARIETIES LSV 2016	PROTEIN	REL YIELD
Faustus B	2	105
<b>Benchmark B</b>	<b>2</b>	<b>105</b>
KWS SALIX	2	105
Porthus B	3	103
Bergamo B	4	103
KWS MADDOX B	2	103
Gustav B	3	101
Kredo B	4	101

	- Group	A - Group	B - Group	C - Group
	Elite- Weizen	Qualitäts- Weizen	Brot- Weizen	sonstiger Weizen
	<b>&gt;= 8</b>	<b>&gt;= 6</b>	<b>BENCHMARK 4</b> <b>&gt;= 4</b>	-
FALING NUMBER	>= 6	>= 5	>= 4	-
PROTEIN CONTENT	>= 6	>= 4	<b>BENCHMARK 2,01</b> >= 2	-
ZELENY SEDIMENTATION	>= 7	>= 5	>= -	
WATER ABSOBTION	>= 4	>= 3	>= -	
FLOUR YIELD	>= 5	>= 5	>= -	
etc..				



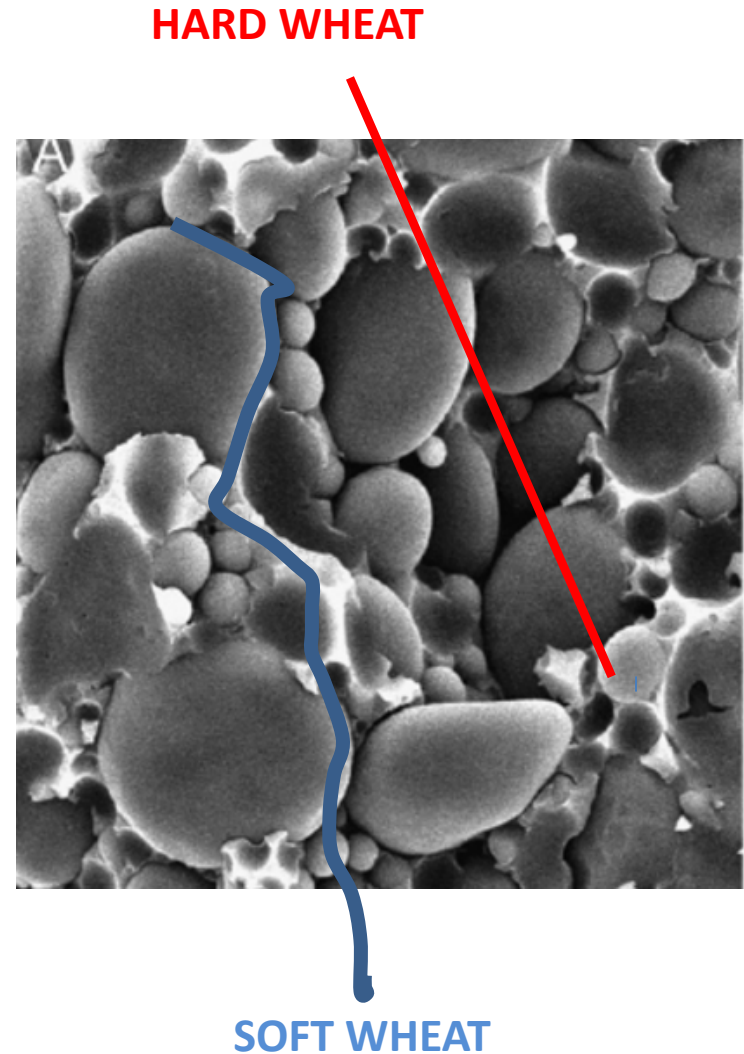
<b>GROUP</b>	<b>TYPE</b>	<b>MARKET%</b>
<b>Group 1</b>	<b>Bread wheat</b>	<b>19</b>
<b>Group 2</b>	<b>Milling wheat</b>	<b>8</b>
<b>Group 3</b>	<b>Bisquit wheat</b>	<b>8</b>
<b>Group 4S</b>	<b>Soft feed wheat</b>	<b>14</b>
<b>Group 4H</b>	<b>Hard feed wheat</b>	<b>48</b>



GROUP	TYPE	MARKET%
Group 1	Bread wheat	19
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Group 3	Bisquit wheat	8
Group 4S	Soft feed wheat	14
Group 4H	Hard feed wheat	48

**HARD WHEAT = HIGH STARCH DAMAGE =  
HIGH WATER UPTAKE**

**SOFT WHEAT = LOW STARCH DAMAGE =  
LOW WATER UPTAKE**



# UK BREAD WHEAT STANDARDS

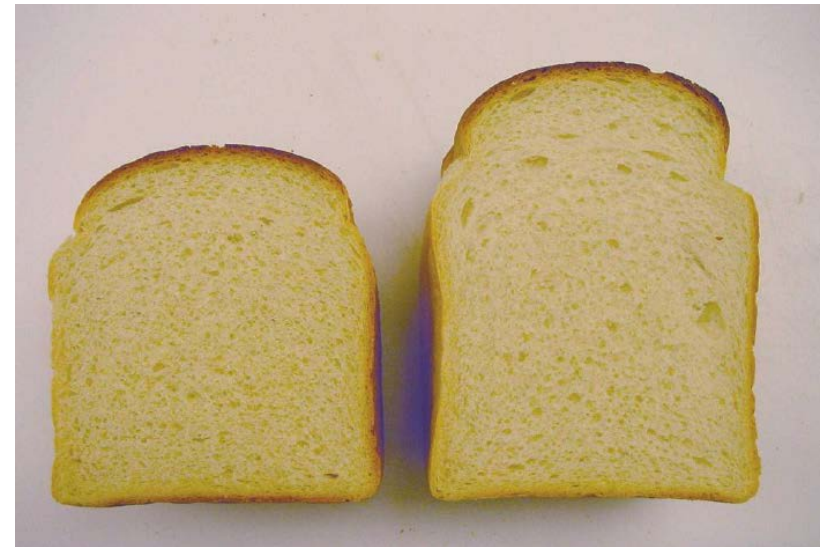
GROUP	TYPE	MARKET%
Group 1	Bread wheat	19
Group 2	Milling wheat	8
Group 3	Bisquit wheat	8
Group 4S	Soft feed wheat	14
Group 4H	Hard feed wheat	48

Dough preparation



Chorleywood  
Proces  
High mecanical input

BREAD TYPE



## Wheat/flour properties required for processing


	<b>Bread</b>	<b>Biscuits</b>
<b>Endosperm texture</b>	Hard milling	Soft milling
<b>Protein content (wheat)</b>	High (13%db)	Low (11%db)
<b>Protein/dough quality</b>	Elastic and extensible	Extensible
<b><i>Alpha</i>-amylase activity</b>	Low (HFN>250s)	Low (HFN>180s)
<b>Specific weight</b>	High (>76kg/hl)	High (>76kg/hl)
<b>Bran levels</b>	Low (for white)	Low (for white)
<b>Water absorption</b>	High (>60%)	Low (<55%)





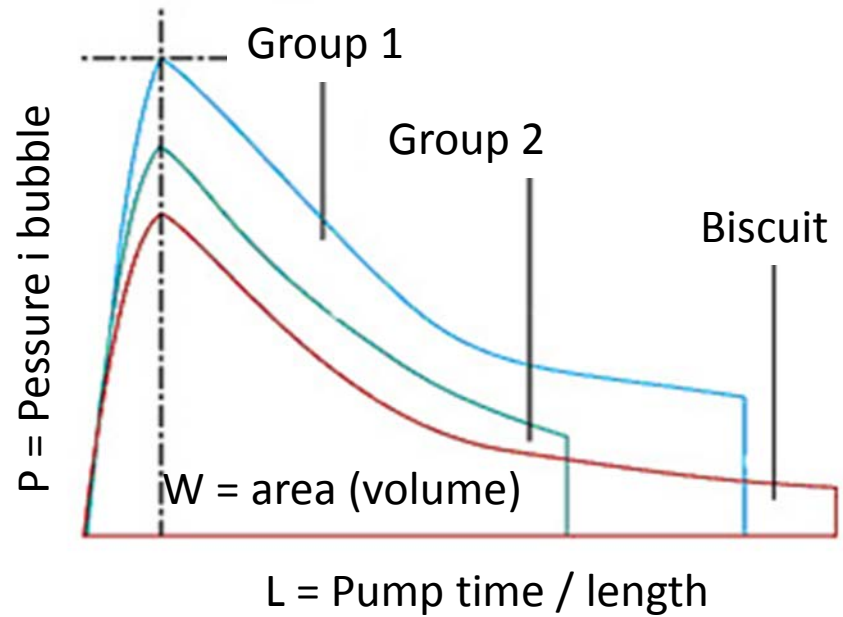
## AHDB Recommended List (selected varieties – 41 varieties on the list).

### MARKET OPTIONS, YIELD AND GRAIN QUALITY

	KWS Zyatt	KWS Trinity	KWS Lili	Cordiale	Britannia	Zulu	LG Sundance	Hardwicke	KWS Kerrin	Belgrade	Evolution
	nabim Group 1	nabim Group 2	nabim Group 3	Soft Group 4	Hard Group 4						
<b>End-use group</b>	nabim Group 1		nabim Group 2		nabim Group 3		Soft Group 4		Hard Group 4		
<b>Main market options</b>											
UK breadmaking	P	Y	Y	Y	-	-	-	-	-	-	-
UK biscuit, cake-making	-	-	-	-	Y	Y	-	-	-	-	-
UK distilling	-	-	-	-	-	[Y]	[Y]	[Y]	-	-	-
<b>Grain quality</b>											
Endosperm texture	Hard	Hard	Hard	Hard	Soft	Soft	Soft	Soft	Hard	Hard	Hard
Protein content (%)	11,9	11,6	11,2	12,0	11,6	11,3	11,0	11,0	10,5	11,0	10,8
Hagberg Falling Number	273	342	297	324	228	233	179	195	135	193	195
Specific weight (kg/hl)	77,7	76,9	76,5	79,0	76,3	75,6	74,5	75,5	75,7	75,0	74,2
Chopin alveograph W	196	263	199	[230]	96	97	75	88	-	-	[198]
Chopin alveograph P/L	0,6	1,1	0,8	[0.8]	0,2	0,3	0,4	0,7	-	-	[1.4]



## ALVEOGRAPH WHEAT QUALITY



## UK TEST :

### SAMPLE MATERIAL :

**NABIM** quality stripes

**8 locations**

**Protein level up to 13 %**

### **NABIM** Varieties Working Group

(>3, > 50% market)

- Allied Mills
- ADM Milling Ltd
- Rank Hovis Ltd/Premier Foods
- Carr's Flour Mills Ltd
- Whitworths Holdings Ltd
- Heygates Ltd
- Jas Bowman & Son Ltd
- Campden BRI





# EVOLUTION

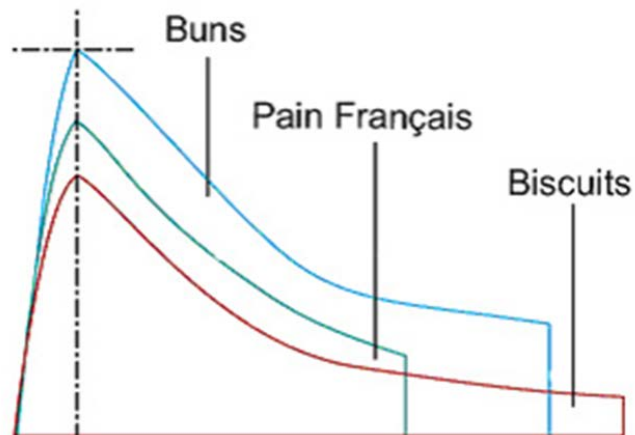
High molecular weight glutenin subunits (HMW-GS) :

Glu-A1 : 1

Glu-D1 : 5-10


Alveograph P/L 1,4

Overstrong ??



# AHDB Recommended List (selected varieties – 41 varieties on the list).

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UK biscuit, cake-making	-	-	-	-	Y	Y	-	-	-	-	-
UK distilling	-	-	-	-	-	[Y]	[Y]	[Y]	-	-	-
<b>Grain quality</b>											
Endosperm texture	Hard	Hard	Hard	Hard	Soft	Soft	Soft	Soft	Hard	Hard	Hard
Protein content (%)	11,9	11,6	11,2	12,0	11,6	11,3	11,0	11,0	10,5	11,0	10,8
Hagberg Falling Number	273	342	297	324	228	233	179	195	135	193	195
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**UK**  
**SOFT wheat**  
**Low water uptake**  
**LOW P/L Amylograph**



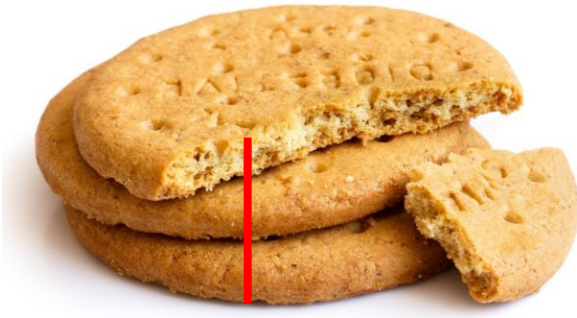
**GERMANY**  
**Low water uptake**  
**"Glutenaggregationstest"**  
**Low gluten development**



**DENMARK**  
**Hard wheat**  
**Low protein**



**UK**  
**SOFT wheat**  
**Low water uptake**  
**LOW P/L Amylograph**



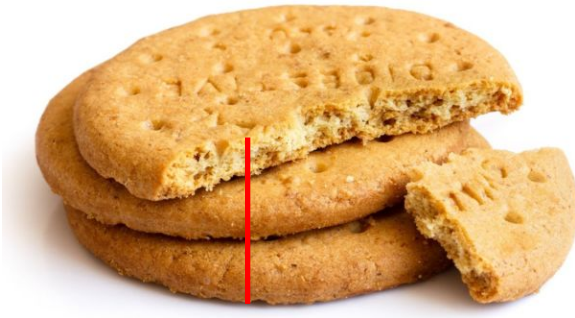
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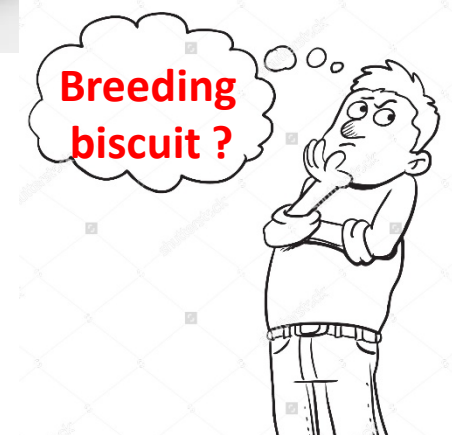
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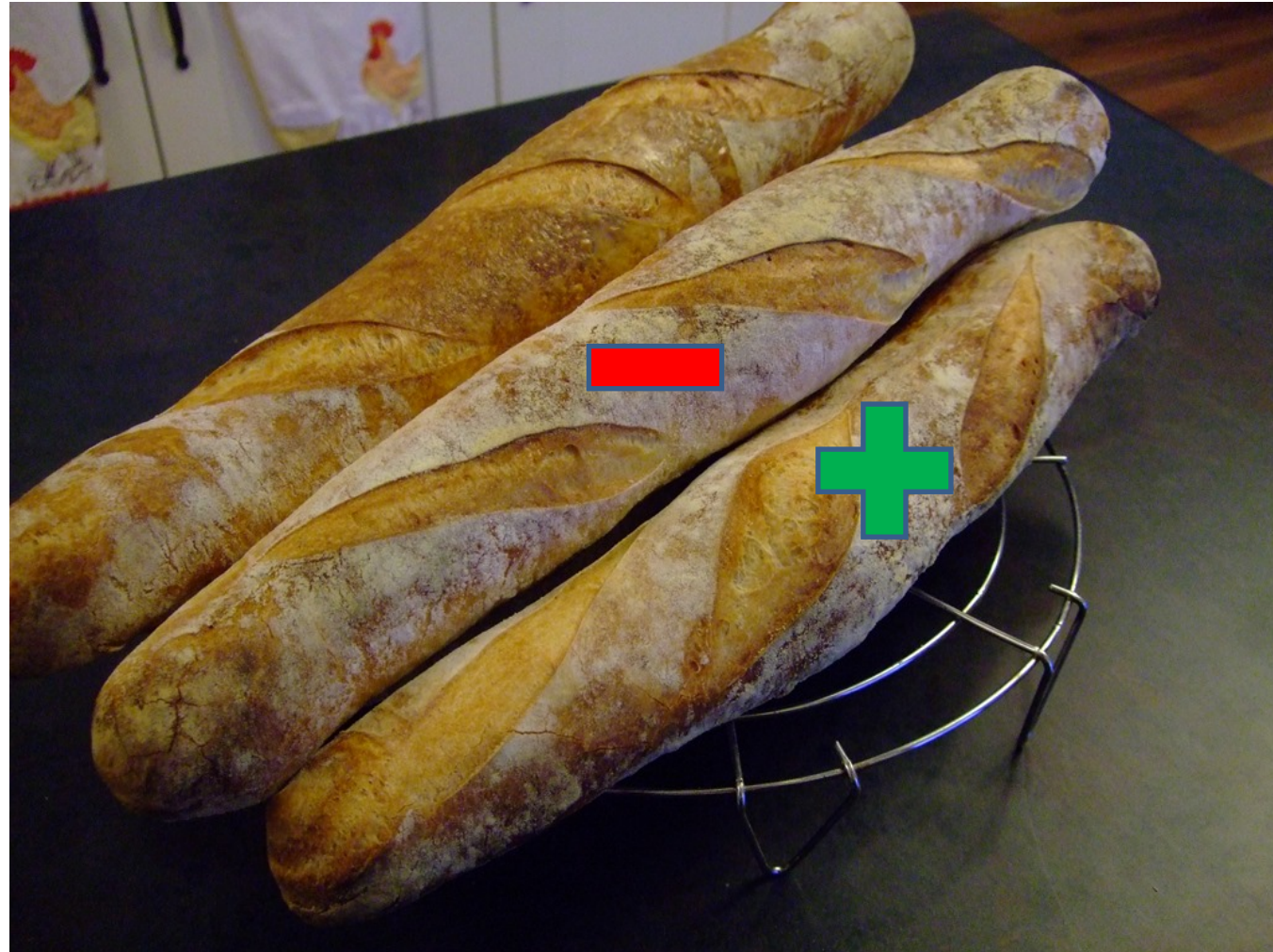
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