

# Case study

## Atopic dermatitis improves, regurgitation resolves, and bowel movements normalize when goat milk formula used as a substitute for cow milk formula

Goat milk protein possesses several attributes that make it naturally easy to digest. It contains less alpha s1 casein than cow milk<sup>1</sup> and its' casein micelles are larger than casein micelles from cow milk<sup>1</sup>. As a result, goat milk protein produces a smaller, softer and looser coagulate (curd) in the stomach than cow milk protein<sup>2,3</sup> and it is also digested more quickly than cow milk protein<sup>4</sup>.

Despite these positive findings, clinical information on the use of goat milk formula is limited. This case study reports on the evolution of symptoms in an 11 month-old child when goat milk formula is used as a substitute for cow milk formula.

**Presentation:** GW is an 11-month-old male who presented with atopic dermatitis, regurgitation, loose stools, as well as respiratory congestion, and recurrent otitis media, all possibly triggered or exacerbated by cow milk consumption.

At baseline, the total Cow's Milk-Related Symptom Score (CoMiSS) was 12, and the mother's happiness or satisfaction with her child's health was rated as 2/10.

### Specific symptom intensity captured by the CoMiSS at baseline included:

| Symptom       | Score | Description  |
|---------------|-------|--|
| Regurgitation | 2/6   | > 5 episodes of > 1 teaspoon (5ml) daily                                     |
| Stool         | 4/6   | Type 6 or liquid stool   |
| Skin          | 3/6   | Mild symptoms on the upper arms and face and moderate symptoms over the legs |
| Respiratory   | 3/3   | Characterized as severe  |

**Therapeutic intervention:** The therapeutic intervention involved the elimination of cow milk dairy, including cow milk formula, for 12 days. Goat milk formula was used as a substitute for cow milk formula.

**Outcomes:** Symptom intensity was re-evaluated after 12 days using the CoMiSS, as was the mother's happiness or satisfaction with her child's health.

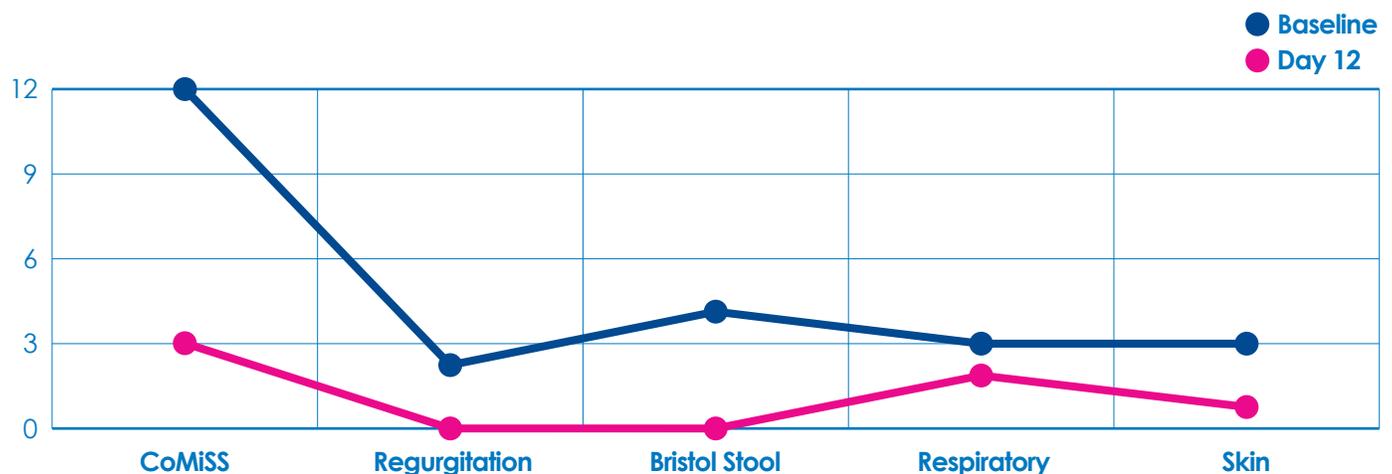
The mother reported that GW experienced normal, solid, and well-formed bowel movements since day 9 on goat milk formula. Atopic dermatitis symptoms improved within 4 days of making the switch to a goat milk formula. Skin symptoms resolved completely on the arms and face, and remained mild on the legs. Respiratory symptoms were reported as mild.



On day 12, the total CoMiSS was 3, a 9-point positive change, or 75% improvement, from baseline. The mother's happiness or satisfaction with her child's health was rated as 7/10, a 50% improvement from baseline.

### Specific symptom intensity captured by the CoMiSS on day 12 included:

| Symptom       | Score             | Description   |
|---------------|-------------------|---|
| Regurgitation | 0/6               | 33% improvement on CoMiSS; 100% improvement from baseline |
| Stool         | 0/6 (type 3 or 4) | 66% reduction on CoMiSS; 100% improvement from baseline   |
| Skin          | 1/6               | 33% reduction on CoMiSS; 66% improvement from baseline    |
| Respiratory   | 2/3 (moderate)    | 33% reduction on CoMiSS and improvement from baseline.    |



**Conclusions:** Goat milk formula may be well tolerated by children with cow's milk-related symptoms\*. Children with cow's milk-related symptoms, such as atopic dermatitis, regurgitation, and functional gastrointestinal symptoms such as loose stools, may experience rapid symptom improvement by substituting cow milk formula with goat milk formula.

1 Park YW, et al. Physico-chemical characteristics of goat and sheep milk. *Small Rumin Res.* 2007;68:88-113

2 Ceballos LS, et al. Utilization of nitrogen and energy from diets containing protein and fat derived from either goat milk or cow milk. *J Dairy Res.* 2009;4:497-504

3 Grant C, et al. Randomized, double-blind comparison of growth in infants receiving goat milk formula versus cow milk infant formula. *J Paediatr Child Health.* 2005;41(11):564-8

4 Almas H, et al. In vitro digestion of bovine and caprine milk by human gastric and duodenal enzymes. *Int Dairy J.* 2006;16:961-68

\* Not suitable for children with a confirmed cow milk protein allergy (CMPA).





# CoMiSS Cow Milk Symptom Score\*

| Symptom   | Score  |  |                      |
|---|--|--|----------------------|
| <b>Crying</b><br>(for greater than one week without any other obvious cause)                    | 0  | ≤ 1 hour/day   |                      |
|   | 1  | 1 - 1.5 hours/day  |                      |
|   | 2  | 1.5 - 2 hours/day  |                      |
|   | 3  | 2 to 3 hours/day   |                      |
|   | 4  | 3 to 4 hours/day   |                      |
|   | 5  | 4 to 5 hours/day   |                      |
|   | 6  | ≥ 5 hours/day  |                      |
| <b>Regurgitation</b>  | 0  | 0-2 episodes/day   |                      |
|   | 1  | ≥ 3 - ≤ 5 of small volume  |                      |
|   | 2  | > 5 episodes of > 1 teaspoon (5 mL)  |                      |
|   | 3  | > 5 episodes of ± half of the feedings in < half of the feedings                       |                      |
|   | 4  | continuous regurgitations of small volumes > 30 min after each feeding                 |                      |
|   | 5  | regurgitation of half to complete volume of a feeding in at least half of the feedings |                      |
|   | 6  | regurgitation of the "complete feeding" after each feeding                             |                      |
| <b>Stools (Bristol scale)</b>   | 4  | type 1 and 2 (hard stools)   |                      |
|   | 0  | type 3 and 4 (normal stools)   |                      |
|   | 2  | type 5 (soft stool)  |                      |
|   | 4  | type 6 (liquid stool, if unrelated to infection)                                       |                      |
|   | 6  | type 7 (watery stools)   |                      |
|   | <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Bristol stool chart</b></p> <ul style="list-style-type: none"> <li> <b>Type 1</b> Separate hard lumps</li> <li> <b>Type 2</b> Lumpy and sausage like</li> <li> <b>Type 3</b> A sausage shape with cracks in the surface</li> <li> <b>Type 4</b> Like a smooth, soft sausage or snake</li> <li> <b>Type 5</b> Soft blobs with clear-cut edges</li> <li> <b>Type 6</b> Mushy consistency with ragged edges</li> <li> <b>Type 7</b> Liquid consistency with no solid pieces</li> </ul> </div> |  |                      |
| <b>Skin symptoms</b>  | 0 to 6   | Atopic eczema  |                      |
|   |  | Head-neck-trunk  | Arms-hands-legs-feet |
|   | Absent   | 0  | 0                    |
|   | Mild   | 1  | 1                    |
|   | Moderate   | 2  | 2                    |
|   | Severe   | 3  | 3                    |
|   | 0 or 6   | Urticaria (no 0 / yes 6)   |                      |
| <b>Respiratory symptoms</b><br>[Chronic cough, runny nose, wheezing (not related to infection)] | 0  | no respiratory symptoms  |                      |
|   | 1  | slight symptoms  |                      |
|   | 2  | mild symptoms  |                      |
|   | 3  | severe symptoms  |                      |
| <b>Anaphylaxis</b><br>(after consumption of cow milk)   | Immediate referral to health care provider   |  |                      |
| <b>Total</b>  | <b>&lt; 12 Low risk for CMPA**</b>   | <b>≥ 12 Increased risk for CMPA. Screen for CMPA</b>                                   |                      |

\*Designed for infants ≤ 12 months \*\*Cow Milk Protein Allergy  
 KABRITA Goat Milk Toddler Formula is not suitable for children with confirmed cow milk protein allergy (CMPA)  
 Adapted from Vandepias Y, et al. A workshop report on the development of the Cow's Milk-related Symptom Score awareness tool for young children. Acta Paediatr. 2015 Apr;104(4):334-9

# Case study

## Atopic dermatitis improves when goat milk formula used as a substitute for cow milk formula

In children, the most common foods that aggravate atopic dermatitis are cow milk products, eggs, peanuts, wheat, soy, and fish<sup>1</sup>. Goat milk protein possesses several attributes that make it naturally easy to digest. It contains less alpha s1 casein than cow milk<sup>2</sup> and its' casein micelles are larger than casein micelles from cow milk<sup>2</sup>. As a result, goat milk protein produces a smaller, softer and looser coagulate (curd) in the stomach than cow milk protein<sup>3,4</sup> and it is also digested more quickly than cow milk protein<sup>5</sup>.

Despite these positive findings, clinical information on the use of goat milk formula is limited. This case study reports on the evolution of symptoms associated with atopic dermatitis in an 11 month-old child when goat milk formula is used as a substitute for cow milk formula.

**Presentation:** CR is an 11-month-old male with persistent, moderate-to-severe atopic dermatitis [AD]. The AD is moderate to severe over his legs and mild to moderate over his trunk, arms and neck. Lesions are erythematous, excoriated, dry, and flaking. Based on Cow's Milk-Related Symptom Score (CoMiSS), skin symptom intensity score was 3/6.

**Therapeutic intervention:** The therapeutic intervention involved the elimination of cow milk dairy, including cow milk formula, for three weeks; goat milk formula was used as a substitute for cow milk formula.

**Outcomes:** Atopic dermatitis symptom intensity was re-evaluated at the end of three weeks using the CoMiSS. There was a 2-point improvement in atopic dermatitis symptom intensity, from 3/6 to 1/6. CR experienced a 33% reduction in atopic dermatitis symptoms on the CoMiSS, a 66% absolute improvement from baseline.

**Conclusions:** Goat milk formula may be well tolerated by children with cow's milk-related symptoms\*. Children with cow's milk-related symptoms, such as atopic dermatitis, may experience rapid symptom improvement by substituting cow milk formula with goat milk formula.

1 Guibas GV, et al. Atopic Dermatitis, food allergy and dietary interventions. A tale of controversy.

An Bras Dermatol. 2013;88(5): 839-41

2 Park YW, et al. Physico-chemical characteristics of goat and sheep milk. Small Rumin Res. 2007;68:88-113

3 Ceballos LS, et al. Utilization of nitrogen and energy from diets containing protein and fat derived from either goat milk or cow milk. J Dairy Res. 2009;4:497-504

4 Grant C, et al. Randomized, double-blind comparison of growth in infants receiving goat milk formula versus cow milk infant formula. J Paediatr Child Health. 2005;41(11):564-8

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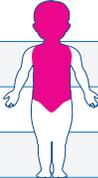
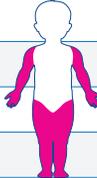


# CoMiSS Cow Milk Symptom Score\*

| Symptom  | Score |  |
|--|-------|--|
| <b>Crying</b><br>(for greater than one week without any other obvious cause) | 0     | ≤ 1 hour/day   |
|  | 1     | 1 - 1.5 hours/day  |
|  | 2     | 1.5 - 2 hours/day  |
|  | 3     | 2 to 3 hours/day   |
|  | 4     | 3 to 4 hours/day   |
|  | 5     | 4 to 5 hours/day   |
|  | 6     | ≥ 5 hours/day  |
| <b>Regurgitation</b>   | 0     | 0-2 episodes/day   |
|  | 1     | ≥ 3 - ≤ 5 of small volume  |
|  | 2     | > 5 episodes of > 1 teaspoon (5 mL)  |
|  | 3     | > 5 episodes of ± half of the feedings in < half of the feedings                       |
|  | 4     | continuous regurgitations of small volumes > 30 min after each feeding                 |
|  | 5     | regurgitation of half to complete volume of a feeding in at least half of the feedings |
|  | 6     | regurgitation of the "complete feeding" after each feeding                             |
| <b>Stools (Bristol scale)</b>  | 4     | type 1 and 2 (hard stools)   |
|  | 0     | type 3 and 4 (normal stools)   |
|  | 2     | type 5 (soft stool)  |
|  | 4     | type 6 (liquid stool, if unrelated to infection)                                       |
|  | 6     | type 7 (watery stools)   |

**Bristol stool chart**

-  **Type 1** Separate hard lumps
-  **Type 2** Lumpy and sausage like
-  **Type 3** A sausage shape with cracks in the surface
-  **Type 4** Like a smooth, soft sausage or snake
-  **Type 5** Soft blobs with clear-cut edges
-  **Type 6** Mushy consistency with ragged edges
-  **Type 7** Liquid consistency with no solid pieces

| Skin symptoms | Score   |   |
|---------------|---|---|
|               | Head-neck-trunk   | Arms-hands-legs-feet  |
| Absent        | 0  | 0  |
| Mild          | 1   | 1   |
| Moderate      | 2   | 2   |
| Severe        | 3   | 3   |
| 0 or 6        | Urticaria (no 0 / yes 6)  |   |

|   |  |  |
|---|--|--|
| <b>Respiratory symptoms</b><br>[Chronic cough, runny nose, wheezing (not related to infection)] | 0  | no respiratory symptoms                              |
|   | 1  | slight symptoms                                      |
|   | 2  | mild symptoms  |
|   | 3  | severe symptoms                                      |
| <b>Anaphylaxis</b><br>(after consumption of cow milk)   | Immediate referral to health care provider |  |
| <b>Total</b>  | <b>&lt; 12 Low risk for CMPA**</b>         | <b>≥ 12 Increased risk for CMPA. Screen for CMPA</b> |

\*Designed for infants ≤ 12 months \*\*Cow Milk Protein Allergy

KABRITA Goat Milk Toddler Formula is not suitable for children with confirmed cow milk protein allergy (CMPA)  
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# Case study

## Cessation of regurgitation when goat milk formula used as a substitute for cow milk formula

Goat milk protein possesses several attributes that make it naturally easy to digest. It contains less alpha s1 casein than cow milk<sup>1</sup> and its' casein micelles are larger than casein micelles from cow milk<sup>1</sup>. As a result, goat milk protein produces a smaller, softer and looser coagulate (curd) in the stomach than cow milk protein<sup>2,3</sup> and it is also digested more quickly than cow milk protein<sup>4</sup>.

Despite these positive findings, clinical information on the use of goat milk formula is limited. This case study reports on the evolution of symptoms associated with regurgitation in an 11 month-old child when goat milk formula is used as a substitute for cow milk formula.

**Presentation:** BE is an 11-month-old female with a chronic, non illness-related, wet cough and persistent, profuse and frequent regurgitation. Based on the Cow's Milk-Related Symptom Score (CoMiSS), respiratory congestion intensity was 2/3 (mild symptoms), and regurgitation intensity was 2/6, which is >5 episodes of >1 teaspoon (5 ml) daily.

**Therapeutic intervention:** The therapeutic intervention involved the elimination of cow milk dairy, including cow milk formula, for three weeks; goat milk formula was used as a substitute for cow milk formula.

**Outcomes:** Respiratory congestion and regurgitation symptom intensity was re-evaluated at the end of three weeks using CoMiSS, as was the mother's happiness or satisfaction with her child's health.

While respiratory symptoms remained unchanged, there was a 2-point positive improvement in regurgitation symptom intensity, from 2/6 to 0/6. BE experienced a 33% reduction in regurgitation on CoMiSS, a 100% absolute improvement from baseline. The mother's happiness or satisfaction with her child's health was 7/10, a 20% improvement from baseline.

**Conclusions:** Goat milk formula may be well tolerated by children with cow's milk-related symptoms\*. Children with cow's milk-related symptoms, such as regurgitation, may experience rapid symptom improvement by substituting cow milk formula with goat milk formula.

1 Park YW, et al. Physico-chemical characteristics of goat and sheep milk. *Small Rumin Res.* 2007;68:88-113

2 Ceballos LS, et al. Utilization of nitrogen and energy from diets containing protein and fat derived from either goat milk or cow milk. *J Dairy Res.* 2009;4:497-504

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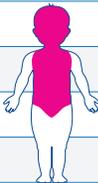
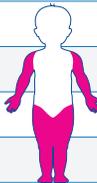
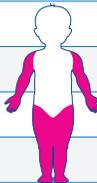
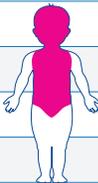
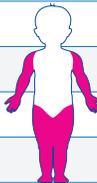
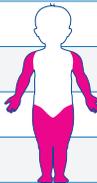
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# CoMiSS Cow Milk Symptom Score\*

| Symptom   | Score  |  |   |
|---|--|--|---|
| <b>Crying</b><br>(for greater than one week without any other obvious cause)                    | 0  | ≤ 1 hour/day   |   |
|   | 1  | 1 - 1.5 hours/day  |   |
|   | 2  | 1.5 - 2 hours/day  |   |
|   | 3  | 2 to 3 hours/day   |   |
|   | 4  | 3 to 4 hours/day   |   |
|   | 5  | 4 to 5 hours/day   |   |
|   | 6  | ≥ 5 hours/day  |   |
| <b>Regurgitation</b>  | 0  | 0-2 episodes/day   |   |
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|   | 2  | > 5 episodes of > 1 teaspoon (5 mL)  |   |
|   | 3  | > 5 episodes of ± half of the feedings in < half of the feedings                       |   |
|   | 4  | continuous regurgitations of small volumes > 30 min after each feeding                 |   |
|   | 5  | regurgitation of half to complete volume of a feeding in at least half of the feedings |   |
|   | 6  | regurgitation of the "complete feeding" after each feeding                             |   |
| <b>Stools (Bristol scale)</b>   | 4  | type 1 and 2 (hard stools)   |   |
|   | 0  | type 3 and 4 (normal stools)   |   |
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| <b>Skin symptoms</b>  | 0 to 6   | Atopic eczema  |   |
|   |  | Head-neck-trunk  | Arms-hands-legs-feet  |
|   | Absent   | 0   | 0  |
|   | Mild   | 1   | 1  |
|   | Moderate   | 2   | 2  |
|   | Severe   | 3   | 3  |
|   | 0 or 6   | Urticaria (no 0 / yes 6)   |   |
| <b>Respiratory symptoms</b><br>[Chronic cough, runny nose, wheezing (not related to infection)] | 0  | no respiratory symptoms  |   |
|   | 1  | slight symptoms  |   |
|   | 2  | mild symptoms  |   |
|   | 3  | severe symptoms  |   |
| <b>Anaphylaxis</b><br>(after consumption of cow milk)   |  | Immediate referral to health care provider   |   |
| <b>Total</b>  | <b>&lt; 12 Low risk for CMPA**</b>   | <b>≥ 12 Increased risk for CMPA. Screen for CMPA</b>                                   |   |

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