

Do cows see the forest or the trees? A preliminary investigation of attentional scope as an indicator of emotional state in dairy cows kept with their calves

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In humans, a positive mood broadens attentional scope (i.e. seeing the forest rather than the trees) while negative mood narrows it. For instance, humans in more positive moods will select an image showing a circle made of crosses as being more similar to a circle (global processing) than to a cross (local processing). Attentional scope tests have been used to explore visual hierarchical processing in several animal species, but may also be a promising method to assess affective state. We examined the attentional scope of dairy cows managed full-time or part-time with their calves (24 or 10 h daily cow-calf contact; 6 pairs each). Cows were trained to approach a positive image on a screen (rewarded with food), and to avoid approaching a negative image (else punished with waving bag). The positive image was 13 identical circles (local element) arranged in an overall circle (global element), while the negative image was 13 identical crosses arranged in an overall cross (cross or circle assignment was balanced across cows); thus, these images contained the *same* combination of local and global elements. Once learned (> 80% correct over 2 consecutive days), cows were presented two images showing *different* combinations of global and local elements: an overall circle comprised of crosses ('global' choice), or an overall cross comprised of circles ('local' choice). Each global and local image was presented 4 times, among 4 positive and 3 negative images, over two consecutive test days. Cows were 4 times more likely to approach the local image (odds ratio (95% CL): 4.4 (1.3–15.2); $P=0.02$), but took longer to do so, compared to the global image (14.8 (12.3–17.7) s; vs. 10.3 (7.6–13.7) s, respectively; $P=0.03$). This was driven by part-time cows who never approached the global image, and took longer to approach the local image (27.3 (16.3–45.7) s) compared to full-time cows (11.3 (6.1–20.8) s; $P=0.01$). However, cows approached global and local images much less often than the positive image (8.3 ± 12.4 , 29.2 ± 27.9 and $96.9\pm 5.7\%$ of images approached, respectively). These results suggest cows may show a predominant narrow attentional scope by attending to the local elements of an image. This was especially evident in cows housed part-time with their calves, possibly indicating they may be in a more negative (or less positive) mood than full-time cows. Future research should explore the use of attentional scope to assess the affective state of dairy cows experiencing different management conditions.