

BY THE NUMBERS

by Sungbong Jang, University of Georgia, 2020 AGI intern

Adjustment of Age of Dam/Age of Calf

Ideal adjustments provide accurate values.

Calves with a lighter birth weight (BW) are likely to be lighter at weaning compared to calves that are born heavier if their genetics, feeding and management are the same.

But are there other non-genetic factors that affect birth and weaning weights (WW)?

The age of the dam (AOD) at calving is one of those non-genetic factors. Heifers that produce their first calf may not be physically and physiologically as well-developed as mature cows. This is because the nutrients they consume are used for their own growth, and not solely for lactation, maintenance and gestation like mature females. Likewise, older cows that have already produced many calves may not have the same physiological status as when they were younger. For these reasons, calves born when their dams are younger or older are likely to have lighter weights, both at birth and weaning, than the calves born from dams of intermediate ages.

Another factor affecting WW is the age of the calf (AOC) when they are measured.

Suppose we have calves A and B. Let's assume they are identical twins and other non-genetic factors are the same to make it simple. If we measure the WW of calf A at 180 and calf B at 280 days of age, the

WW of calf B is much heavier than calf A. Is this a fair comparison?

It is not, because they were weighed at different ages. To make it a fair comparison, those differences need to be considered either by modeling age with statistics or by standardizing the records to a common timepoint. At the Association, WW is standardized to a calf age of 205 days.

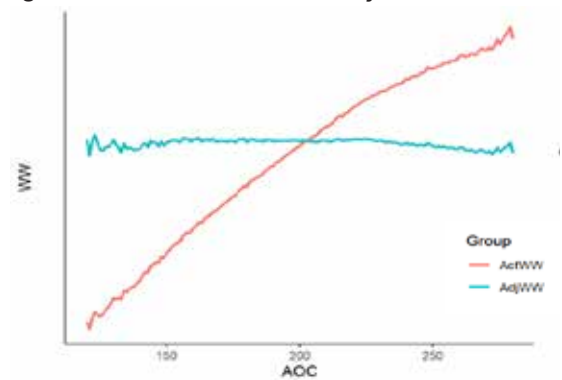
Additionally, the age range for recording WW is between 120 to 280 days and this provides a standard for data recording along with flexibility of weaning dates to breeders.

Once the phenotypic records are properly adjusted for the AOD and AOC, the weights are ready to be combined with other sources of information such as contemporary groups, pedigrees and genotypes, into the weekly evaluations.

How do adjustments work?

The goal of the AOD and AOC adjustments is to allow fair comparisons of calves across different categories. Statistically speaking, we want to make the phenotypic means and variances (squared deviation, or difference,

Figure 1: Mean of actual WW and adjusted WW for AOC



from the mean) equivalent across these categories. This is easier to graphically visualize.

Figure 1 describes the mean of actual WW (red line) and adjusted WW (blue line) for each AOC category (120 to 280 days). Looking at the red line we see on average, as the AOC increases, the WW also increases. In contrast, in the blue line with the adjusted data that trend disappears, and we see a flat line, which means the adjustment is working. As a result, we don't see differences due to age across the AOC subcategories, leading to fair comparison among animals at different ages.

At the Association, the adjustment for AOC and AOD is accomplished in two steps: 1) AOC adjustment; 2) AOD adjustment. In the first step, the actual WW is adjusted for the

AOC, also taking the sex information into account. The male and female calves needed to be adjusted in separate sex groups because male calves grow faster than female calves. This “new” WW, now adjusted to 205 days of age, is then used in the second step together with the actual BW to be adjusted for the AOD.

These two steps generate an adjusted BW for the AOD, and an adjusted WW for both AOD and AOC. The reason why BW is only included in the AOD adjustment step is that it is not affected by the AOC. After all the above steps, those generated adjusted weights are used as input for routine genetic evaluations. Additionally, those adjusted BW and WW are also reported back to breeders.

Updating adjustments

With the addition of more than 300,000 records for BW and WW each year and because of genetic gain over time, it is important to review and update AOD and AOC adjustments as needed to make sure the adjustments properly reflect all phenotypic records being recorded. However, those adjustments were last updated in 2014, so updated adjustment factors were calculated for both AOC and AOD as well as made new AOD categories for better adjustments.

As the Association has been experiencing genomic selection, the genetic gain has increased rapidly. Therefore, old data may not be as reflective of the new data. For these reasons, the adjustment factors for both AOC and AOD were reestimated based on the additional data. Additionally, for the AOD, new categories were defined. The current number of AOD

categories is seven. However, the number of animals in each AOD category is very uneven, possibly creating bias in the adjustments.


To better accommodate the current distribution of the data, AOD categories have been extended from seven to nine. Table 1 describes the age range and adjustment factor for current (www.angus.org/performance/Links) and new AOD categories, only showing WW of male as an example. We can see both age range and adjustment factors are more specifically divided and calculated from current to new categories.

Figure 2 shows the actual and adjusted WW for AOD after the adjustments for AOC and AOD.

Similar to Figure 1, in Figure 2 we see a much flatter line for the adjusted data compared to the unadjusted, meaning the adjustment properly accounts for the effect of different AOD categories on WW.

The Association is committed to providing the most accurate and

stable expected progeny differences (EPDs) to breeders. Accounting for non-genetic differences through proper contemporary grouping and adjustment factors is key in achieving that.

New AOD and AOC adjustment factors will be implemented May 27. Any new birth contemporary groups and their weaning weights created on or after this date will be assessed using these adjustments. 

Editor's note: Sungbong Jang is a graduate research assistant, PhD student from the University of Georgia. He was an Angus Genetics Inc. intern in 2020.

Figure 2: Mean of actual WW (7 categories) and new adjusted WW (9 categories) for AOD

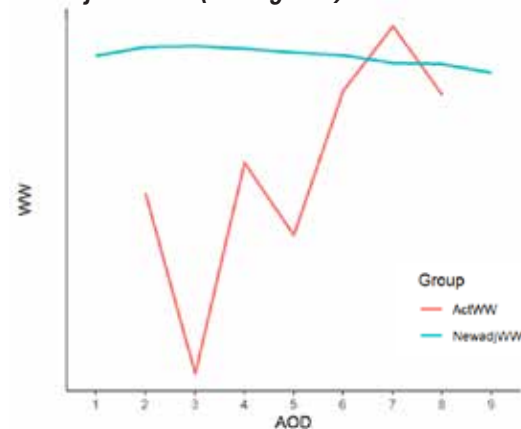


Table 1: Age range, adjustment factor, total number of animals in current and new AOD categories (Male – WW)

AOD	Current			New		
	Age Range	Adjustment Factor	Total individuals	Age range	Adjustment Factor	Total individuals
1	-	-	-	AOD 1,191	65	819,396
2	AOD 973	68	721,476	1,191 AOD 1,565	36	637,985
3	973 AOD 1,186	67	97,102	1,565 AOD 1,928	17	516,967
4	1,186 AOD 1,368	37	570,711	1,928 AOD 2,299	6	415,092
5	1,368 AOD 1,551	29	64,910	2,299 AOD 2,656	1	324,117
6	1,551 AOD 1,916	15	517,647	2,656 AOD 3,026	0	250,407
7	1,916 AOD 3,741	0	1,310,928	3,026 AOD 3,389	1	185,929
8	AOD > 3,741	22	217,184	3,389 AOD 3,760	5	134,112
9	-	-	-	AOD > 3,760	16	215,953

*AOD = calf birth date - dam birth date + 205