

The Complete Effects of Coors Field

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Abstract

1. Introduction

The goal of this project is to analyze the impact Coors Field, home park of the MLB team Colorado Rockies, has on player performance. This is the abbreviated version of our final report; if you would like to see our full report, including additional visuals and a more comprehensive account of our thought process, go [\[HERE\]](#).

2. Coors Effect

Coors Field is located in Denver, Colorado where the altitude is roughly 5,200 feet above sea level, significantly higher than the altitudes of the rest of the MLB parks. This results in the air density at Coors Field being around 18% less than it is at sea level, significantly impacting the way the ball moves, both out of the pitcher's hand and off the bat.

2.1. Out of the Pitcher's Hand

Let's start with how Coors effects movement out of the pitcher's hand. Since pitches move differently depending on the pitcher and pitch type, we grouped pitches by these variables, as well as year to account for changes over time, and split them by when they were thrown at Coors Field vs. all other parks (AOP). Looking at pitchers with at least 100 pitches at both Coors and AOP, we calculated the straight average movement at AOP and how much less the average movement at Coors is.

Pitch Type	Pitcher Count	Horizontal		Vertical	
		Movement (in)	Coors Difference	Movement (in)	Coors Difference
FF (four-seam fastball)	157	+0.63	-22%	+1.31	-18%
SL (slider)	66	-0.32	-6%	+0.23	-20%
SI (sinker)	60	+1.23	-22%	+0.65	-14%
CH (changeup)	37	+1.05	-21%	+0.60	-19%
FC (cutter)	34	-0.18	-14%	+0.59	-19%
CU (curveball)	24	-0.88	-17%	-0.61	-16%
KC (knuckle curve)	18	-0.46	-32%	-0.66	-24%
ST (sweeper)	9	-1.22	-13%	+0.23	-67%
FS (split-finger)	3	+1.04	-26%	+0.25	-3%

Table 1. Induced Movement by Pitch Type

From this, we can see that pitches move less both horizontally and vertically at Coors. Pitches move due to air resistance (drag) and the Magnus effect, which uses air density to create the force of lift and break. Because of the altitude, air density in Denver is roughly 18% lower than the air density at sea level, though other factors like temperature and humidity have an effect as well. Pitch movement should be directly proportional to air density, and our findings support that.

It's unclear how much Coors Field affects pitch placement. Pitchers almost certainly know about the reduced pitch movement and account for it. Plus pitchers likely account for the heightened offensive production at Coors. Add in the

variation in where pitchers aim their pitches and their execution of intended placement, and there's too much noise to make many conclusions.

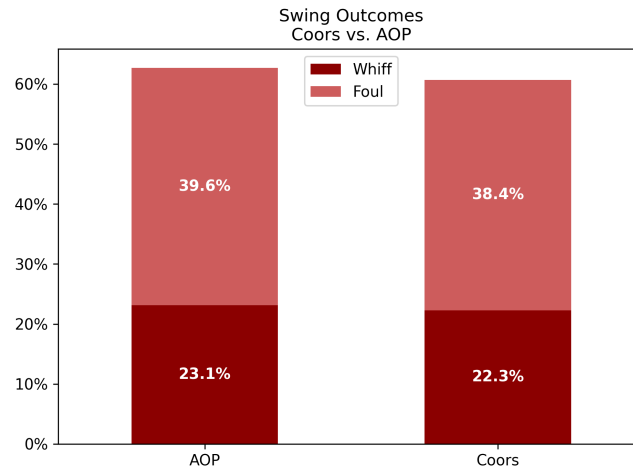


Figure 1. The outcome of swings at Coors vs. AOP.

At Coors Field, swings result in a ball in play roughly 2% more of the time. This may be due to the reduced pitch movement, making it easier to make contact. There was also a slightly increased rate of pitches located in the heart of the strike zone at Coors Field, which would also make it slightly easier to make contact, though this increased rate of pitches down the middle could also be attributed to the reduced pitch movement.

2.2. Off the Bat

Continuing from the effect of Coors on the baseball out of the pitcher's hand and towards the plate, we have the impact off the bat, starting with the final observed effect of the reduced pitch movement.

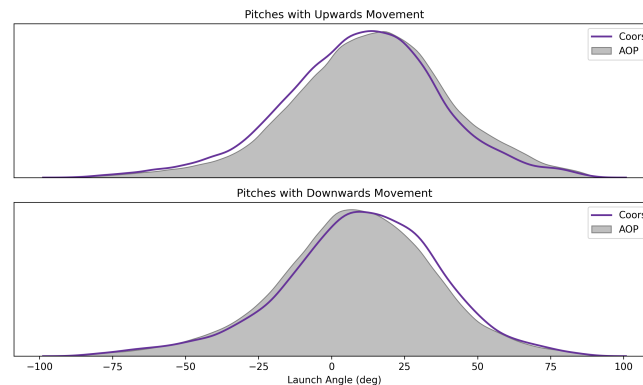


Figure 2. The distribution of launch angles from batted balls.

For pitches with upwards induced movement, the reduced movement at Coors causes the pitches to arrive lower than they appear to be going. As a result, batters tend to get on top of the ball more at Coors, resulting in a lower distribution of launch angles from batted balls at Coors. On the other hand, pitches with downwards induced movement see the opposite effect. The reduced movement at Coors causes these pitches to arrive higher than they appear to be going, resulting in batter getting under the ball and thus a higher distribution of launch angles. Given that the majority of pitches have upwards induced movement, this phenomenon results in more balls in play with low launch angles (i.e. groundballs).

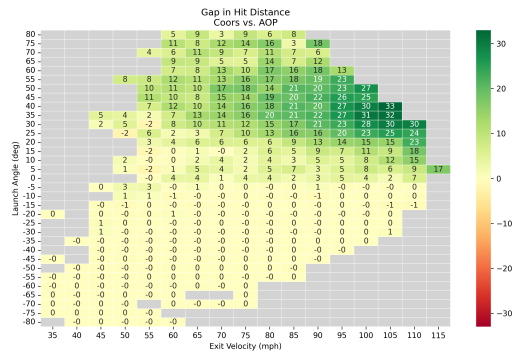


Figure 3. The difference (in ft) between the hit distance at Coors vs. AOP.

2.3. Park Dimensions

2.4. Total Impact

3. Next Steps

References