

## Step 5: Test and Refine the Solution (Debug and Verify)

### Sample Test Cases

Test Scenario	Expected Outcome	Observed Outcome (Simulation)	Discussion / Refinements
1. Pet eats as expected	Bowl weight increases by ~100g. Feeding logged as successful.	Weight increased by 102g. Feeding logged successfully.	Works as intended. No refinement needed.
2. Pet does not eat	Food remains in bowl. System detects uneaten food.	Food remained uneaten; no alert sent initially.	Add <b>post-feeding recheck</b> after 30 minutes to detect uneaten food.
3. Food bin is empty	Servo runs but no food dispensed. Alert sent to owner.	Alert "Food bin empty" triggered.	Works correctly. Could add <b>low-food precheck</b> to prevent failed feeding.
4. Servo jam / motor failure	Feeding fails. Alert sent.	Alert "Servo error – feeding failed" sent.	Works; consider <b>automatic retry</b> before alert to reduce false alarms.
5. Weight sensor malfunction	Unable to detect dispensed food. Alert sent.	Alert "Sensor error – unable to detect feeding" sent.	Works; add <b>retry reading</b> before sending alert for minor glitches.

### Discussion of Logic

- The system **successfully detects feeding events** using the weight sensor.
- Alerts are triggered correctly for **servo or sensor failures**.
- Some scenarios require **additional checks** (e.g., pet not eating food, low food levels).

### System Refinements

1. **Post-Feeding Recheck:** Verify bowl weight 30 minutes after feeding to ensure the pet ate the food.
2. **Low-Food Detection:** Add a pre-feed check to alert if the food bin is below 10% capacity.
3. **Retry Mechanisms:** Retry servo movement or sensor reading once before sending an alert to reduce false positives.
4. **Logging Enhancements:** Keep detailed logs of all events, errors, and alerts for traceability.