

Calculate FCR value

User story

I as a production manager in our enterprise would like to see the FCR (Feed conversion ratio) for my current batch and also for my previous batches per day.

The FCR value is calculated by

```
Total Feed consumption today / ((Current animal weight (per Bird) - Animal weight previous day (per Bird))
* animal count)
```

The total feed consumption for all birds will be sent as a sensor value. The average weight per bird is measured every day. It is based on the number of measurements and not based on the number of animals. The animal count is set initially on stocking date. Over time (e.g. 30 days) of a batch we somehow loose some animals. It could be the case that the number of birds which have been lost will be put in some days after they have been registered on the farm. E.g. The birds will be counted every day and the farmer takes some notes. Only at the end of the week, he puts those values into his Farm Management system for each day.

Example calculation:

Current average bird weight: 110 g

Average Bird weight day before: 100 g

Total feed consumption: 200 kg

Animal count today: 4000

$20 \text{ kg} / ((110 \text{ g} - 100 \text{ g}) * 4000) = 0,5 \text{ FCR}$

Task

Please show the FCR per day (sample period of minimum 10 days with each day as a data point) in a graph. You can use any example data. Consider a reduction of the animal numbers in the past, show the effect on the graph and explain your approach to calculate the FCR.

Event structure

We consider the application architecture to be event-based. This is how the values will be registered.

```
// Batch message to move in birds into a house when they arrived.
message BatchCreated {
  required int32 BatchId = 1;           // Unique Identifier which can be used as a reference
  required string BatchName = 2;       // Name of the batch to identify in the UI
  required datetime StockingDate = 3;  // Date on which the animals arrived and have been moved in
  to the house
  required int32 AnimalCount = 4;      // Number of animals which have been moved in
  required datetime EventOccurenceTime = 5; // DateTime when the event has been sent
}

// This is the manual input, done by the farmer about the birds which will be taken out of the house.
message ReducedNumberOfBirds {
  required int32 BatchId = 1;           // Reference zo the BatchId of the "BatchCreated" meassge
  required datetime RegistrationTime = 2; // Datetime when the animal numbers have been registered by
  the farm worker in the house
```

```
required int32 AnimalCount = 3;           // Number of animals which have been taken out of the house
required datetime EventOccurenceTime = 4; // DateTime when the event has been sent
}

// Consider SensorId 1 as "Total feed consumption today"
// Consider SensorId 2 as "Average weight (per Bird) today"
message SensorValue {
  required int SensorId = 1;           // Id of the sensor which has measured the values
  required datetime MeasurementTime = 2; // DateTime when the events have been measured
  required float value = 3;           // Value which has been measured at the MeasurementTime
  required datetime EventOccurenceTime = 4; // DateTime when the event has been sent
}
```

Estimated time frame and presentation of result

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Expected result: 1 calendar week after receiving the task