# 2020 | AF IL

2020.08.14

## Go/No Go meeting

# Agenda

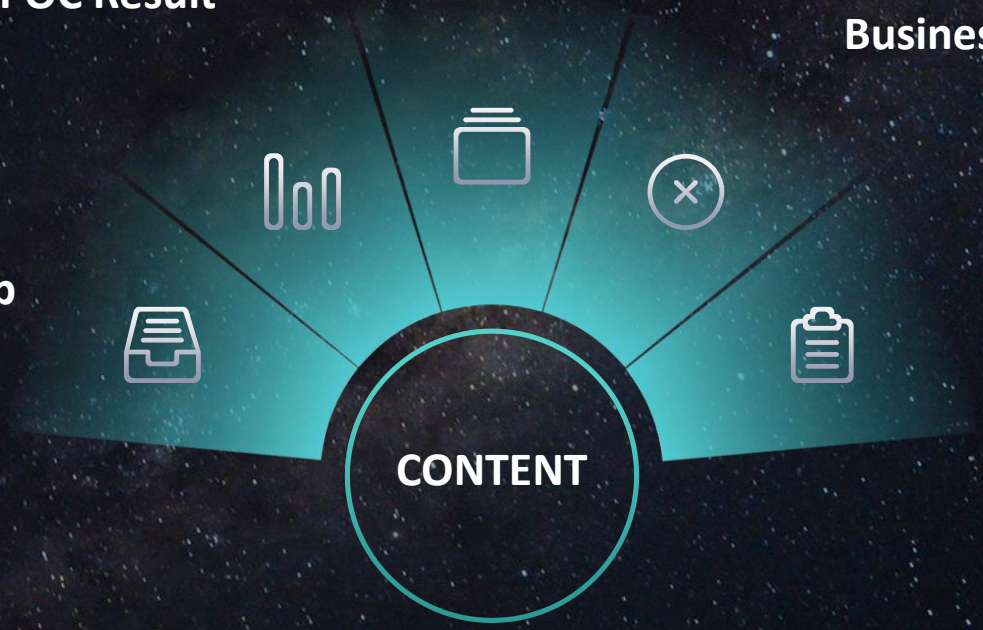
Industrialization Plan

POC Result

Business Impact & Cost

Sprint 4 Follow-up

Decision: Go/No Go?



# 01

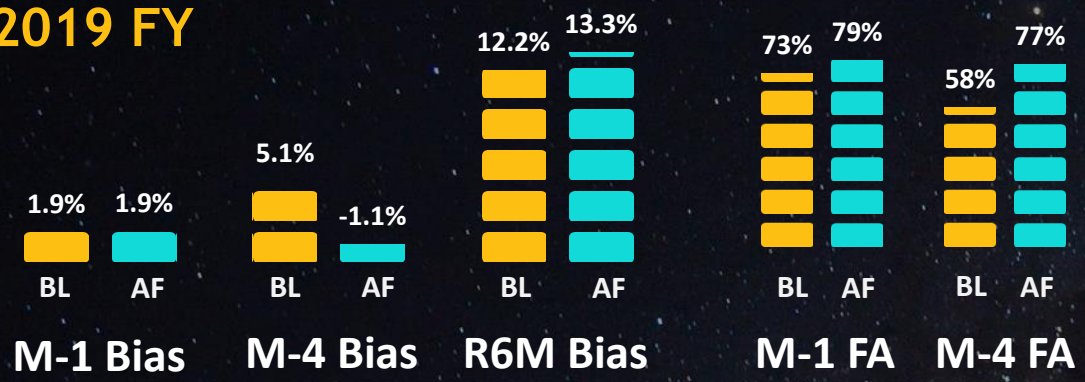
# Sprint 4 Follow - up

01-1. Karicare KPI review

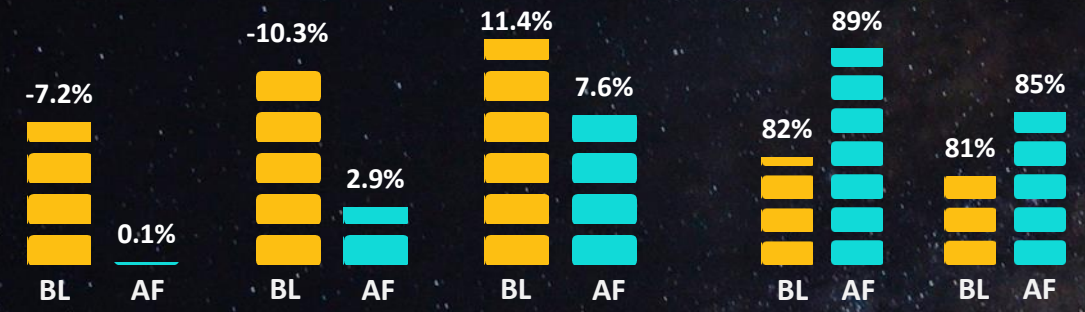
01-2. How AF reflects “Black Swan” –COVID-19

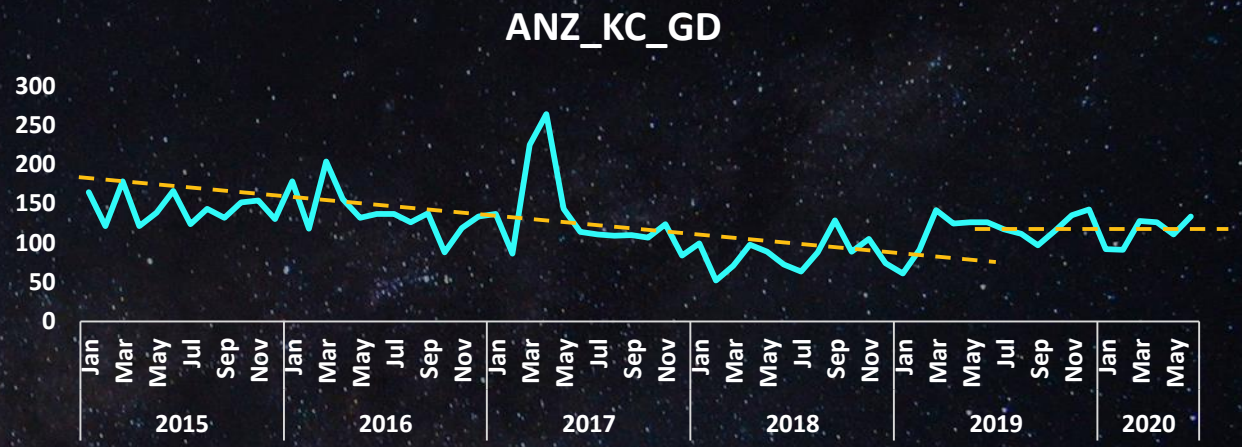
# Follow up –Karicare KPI review

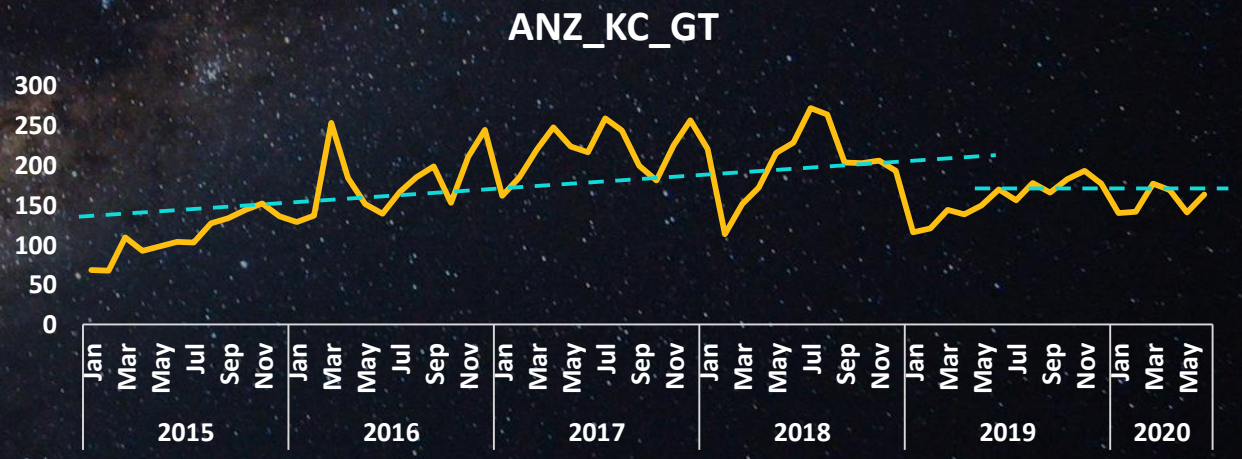
## 2019 FY




## 2020 YTD (Jun)




- Overall Karicare performance is good in 2020, FA over 80%.
- AF even better performed than BL across all KPI dimensions.
- **Finding and Implication:**

1) When sub-brand shown different pattern in the past, brand level bias still performed good because of the mitigation of sub-brands.
2) It is necessary to keep tracking model performance on both brand level and sub-brand level, and switch to the best model

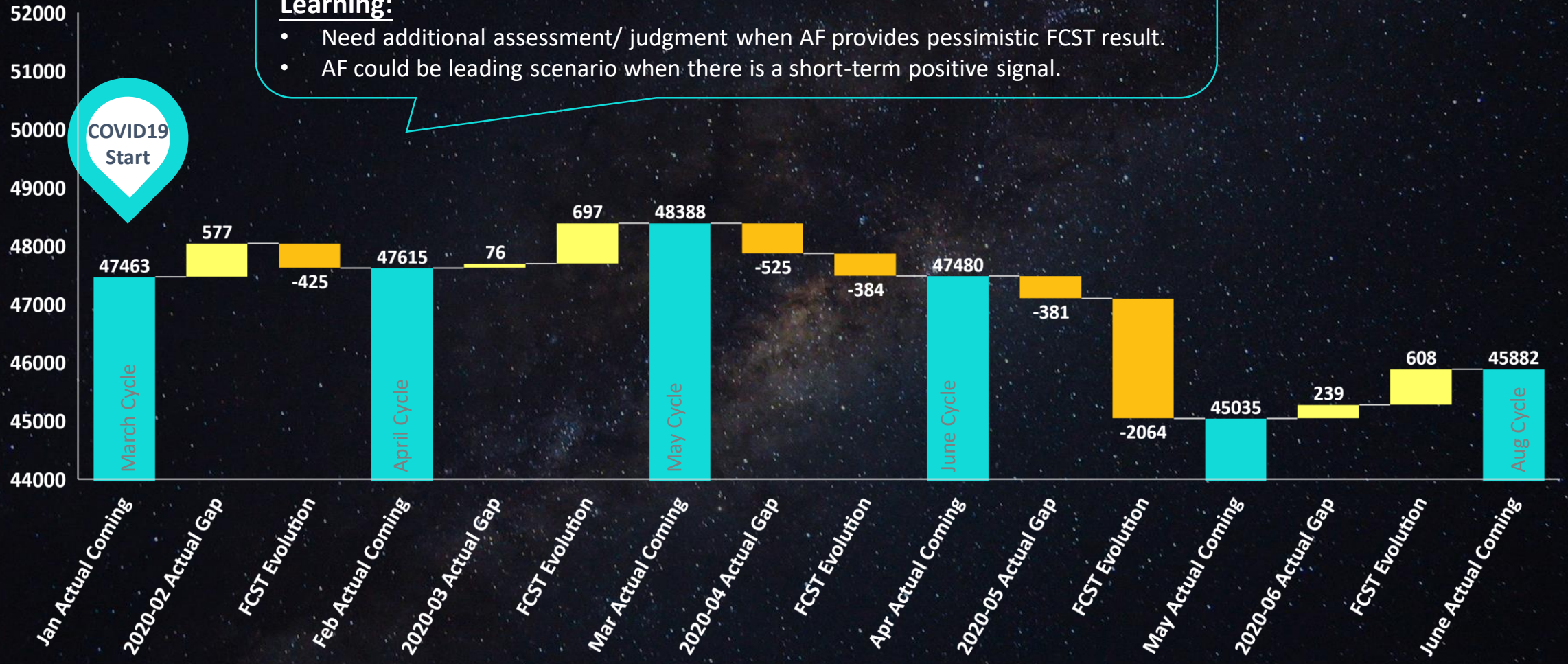
# Follow up – How AF reflects “Black Swan” (IL)

**Findings:**

- AF model shows more conservative forecast.
- AF reflects slowly on increase signal, but fast on decline.

**Learning:**

- Need additional assessment/ judgment when AF provides pessimistic FCST result.
- AF could be leading scenario when there is a short-term positive signal.



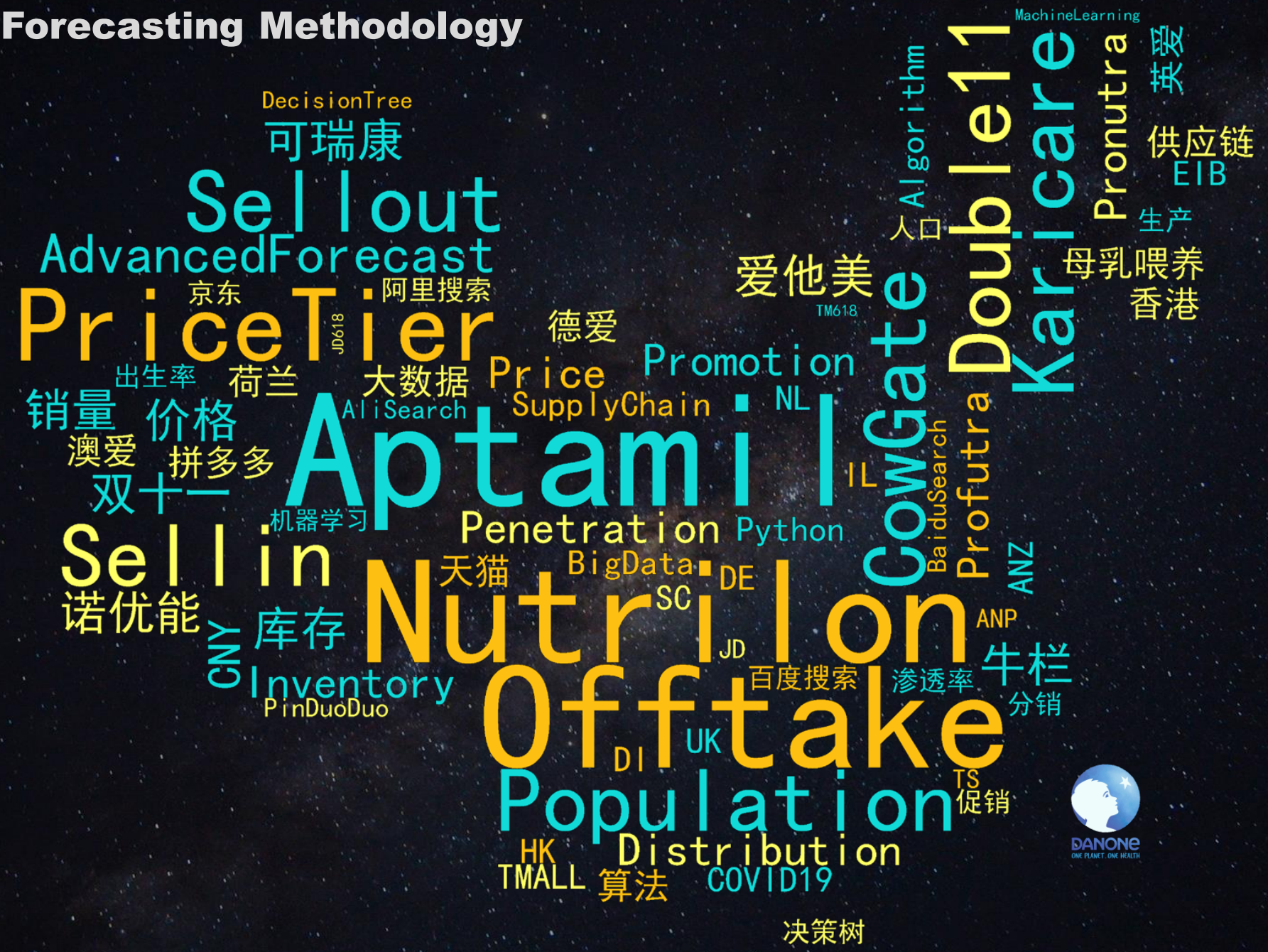
# 02

# POC result

01-1. Use case POC solution

01-2. KPI performance

# Advanced Forecasting Methodology



# Advanced Forecasting Methodology


## Objectives

- Improve IL offtake forecast bias at country/ brand level, FCA optional.
- Avoid aging/ write-off and OOS to support business growth

## Methodology

- Data analysis and engineering
- Feature test
- Machine learning modelling
- Performance evaluation

## Model and Data Evolution

- Add more inputs
- Model finetune at Brand / Sub-brand Level

## Performance

Initial results show good improvement on forecast performance


## Next Step

- Go/Not Go + Industrialization
- DI Roll-out

# AF Model and Data Evolution

| | | | Sprint 0 | Sprint 4 |
|---|---|---|---|---|
| Model | Structure | Native Structure | **DI** (30% AF + 70% baseline FCST) + **EIB AF** | IL native AF |
| | | Native Forecast level | SKU level | Brand + Subbrand level |
| Data | Historical | IL / DI / EIB Offtake | ✓ | ✓ |
| | | IL / DI / EIB Sell-in | ✓ | ✓ |
| | | DI Sellout | ✓ | |
| | | Category (Price Tier) | | ✓ |
| | | Category (Population) | | ✓ |
| | Future | Category FCST (Price Tier) | | ✓ |

# AF Combined Model

Model Selection

Post Processing

| | Brand Model | Sub-brand Model |
|---|---|---|
| ANZ Aptamil | | ✓ |
| ANZ Karicare | ✓ | |
| DE Aptamil | | ✓ |
| Nutrilon | ✓ | |
| UK Aptamil | ✓ | |
| UK C&G | ✓ | |

Sub-Brand Split Ratio Forecast

\+

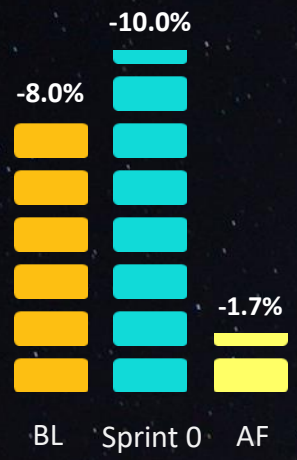
SKU Split Ratio Forecast

SKU Split Ratio Forecast

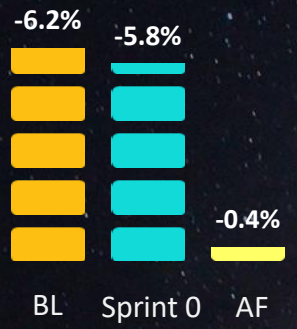
# TTL IL Performance Bias & FA

- TTL IL shows better performance on all KPIs versus both Baseline and Sprint 0.
- 2020 YTD M-4 Bias is not as good as 2019 since unexpected COVID-19 impact, but still better than BL.

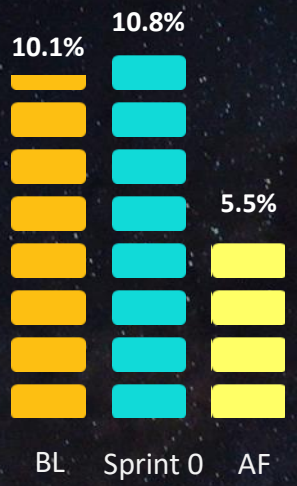
## 2019 FY



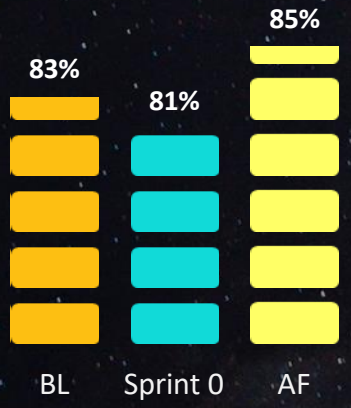

M-1 Bias



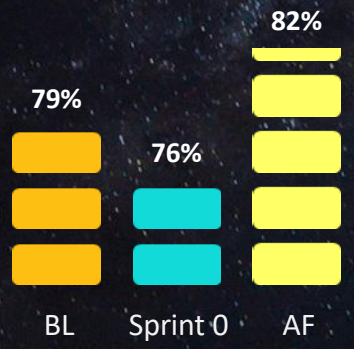

M-4 Bias




R6M Bias

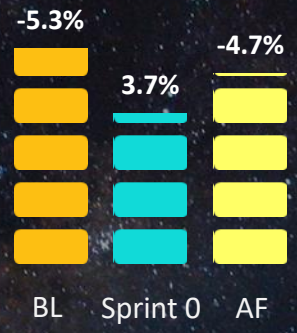



M-1 FA

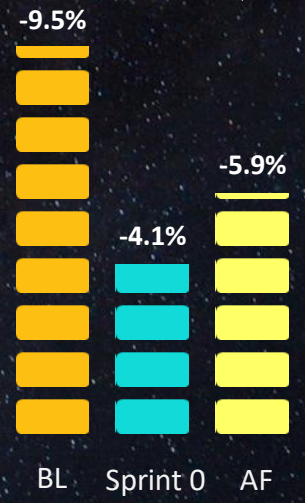



M-4 FA

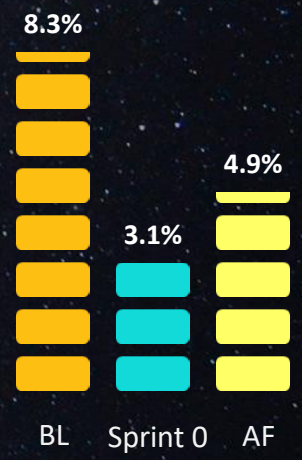
## 2020 YTD (Jun)



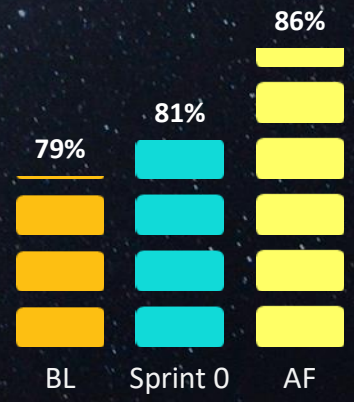

M-1 Bias



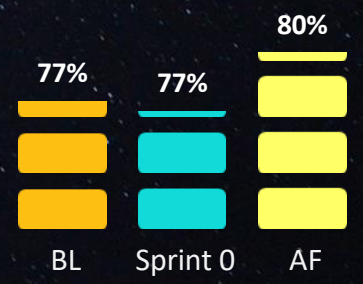

M-4 Bias




R6M Bias



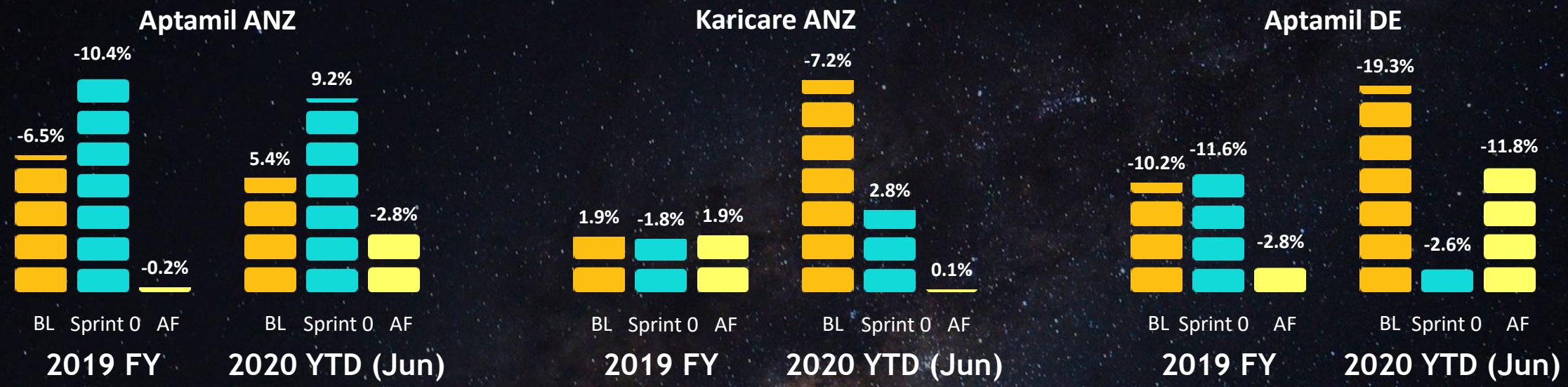

M-1 FA

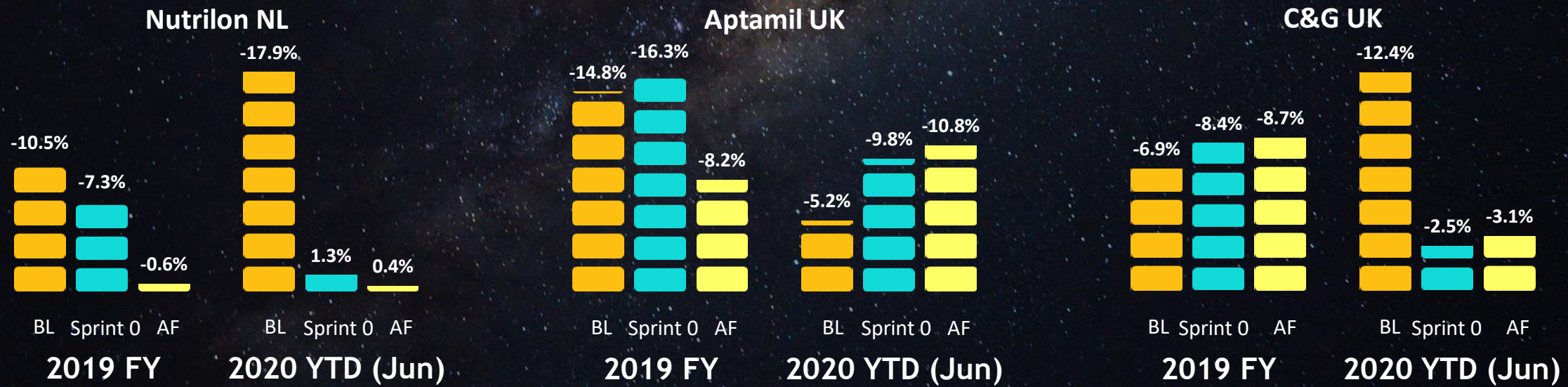



M-4 FA

# IL Brand Performance – M-1 Bias

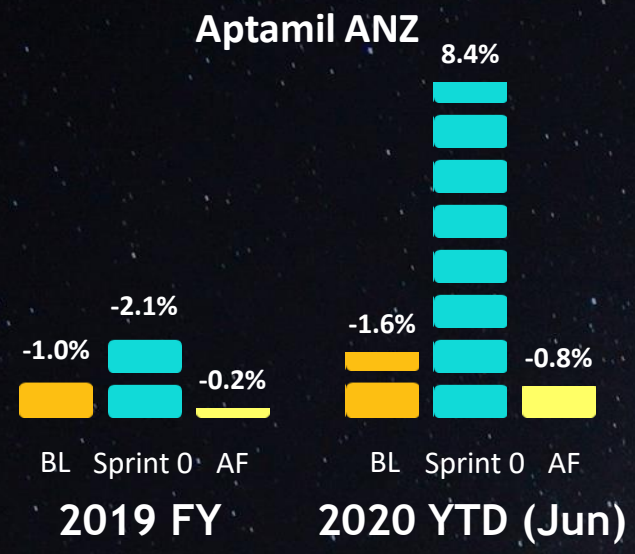
- By sub-brand level, AF still performed outstanding than both BL and Sprint0, especially on ANZ and Nutrilon.



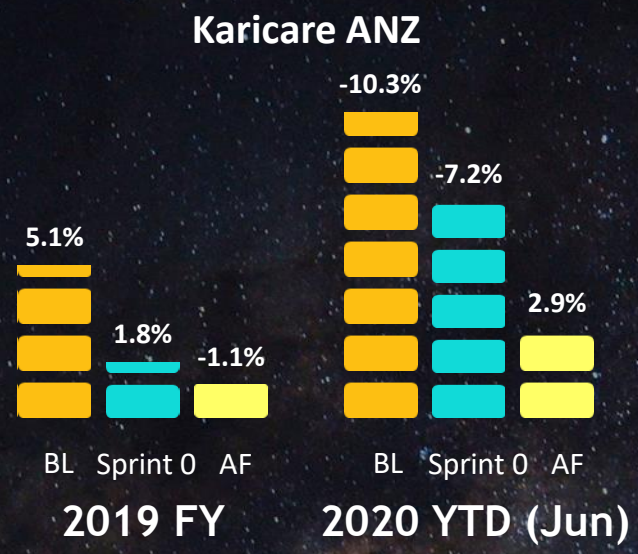
# IL Brand Performance – M-4 Bias

- For long-term FCST, AF still performed better on ANZ and Nutrilon.



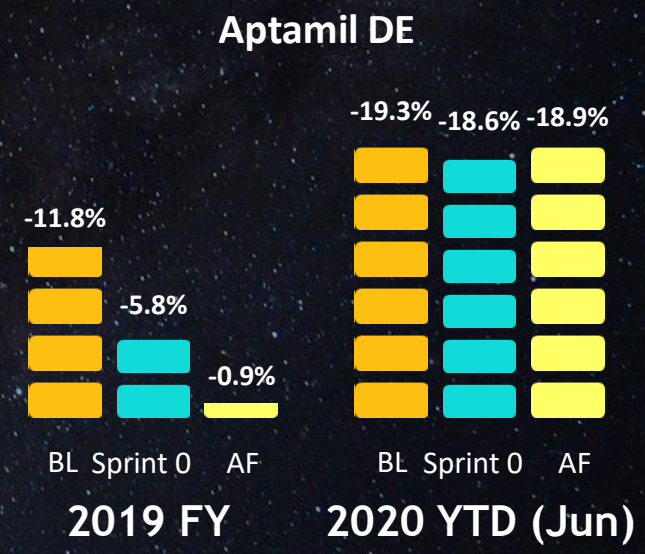






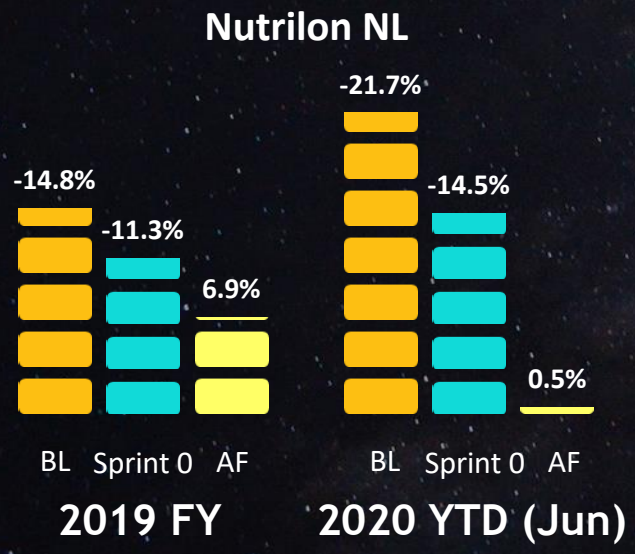






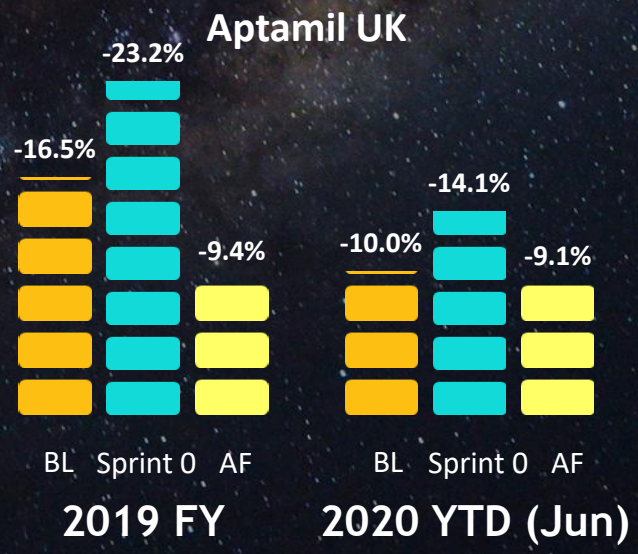






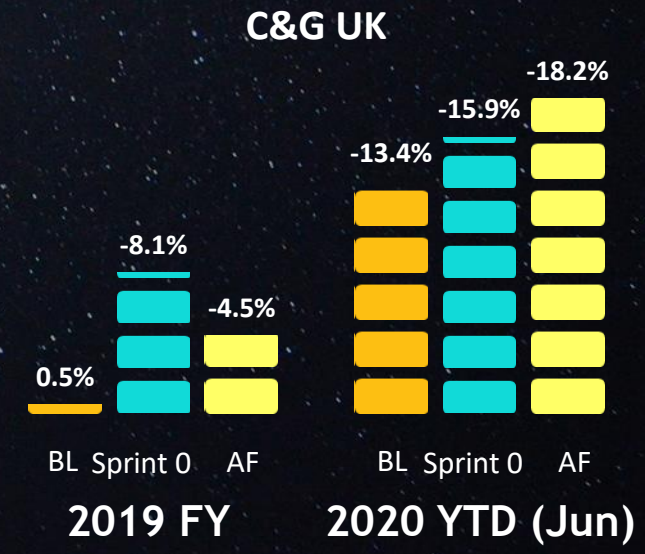






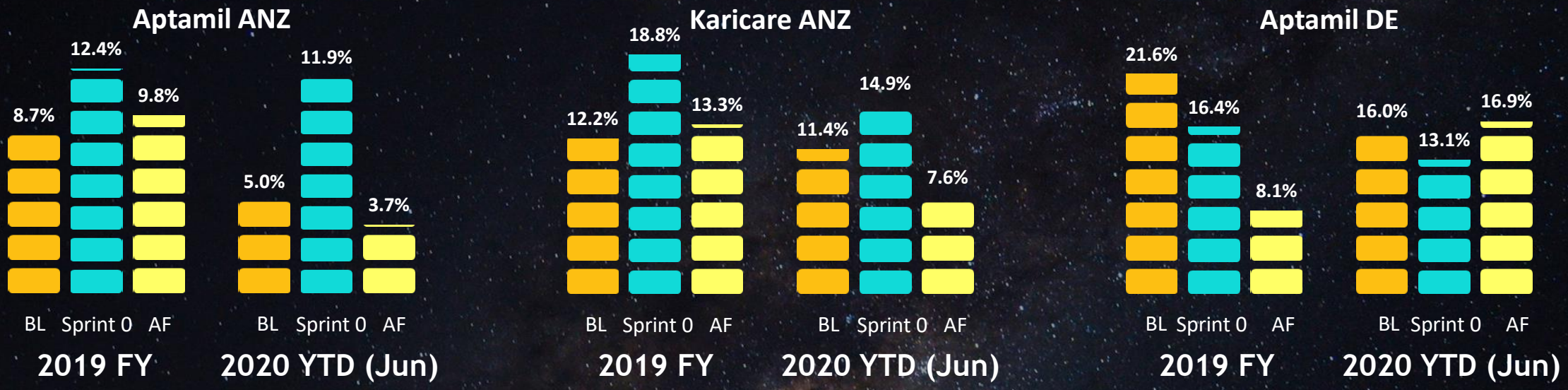


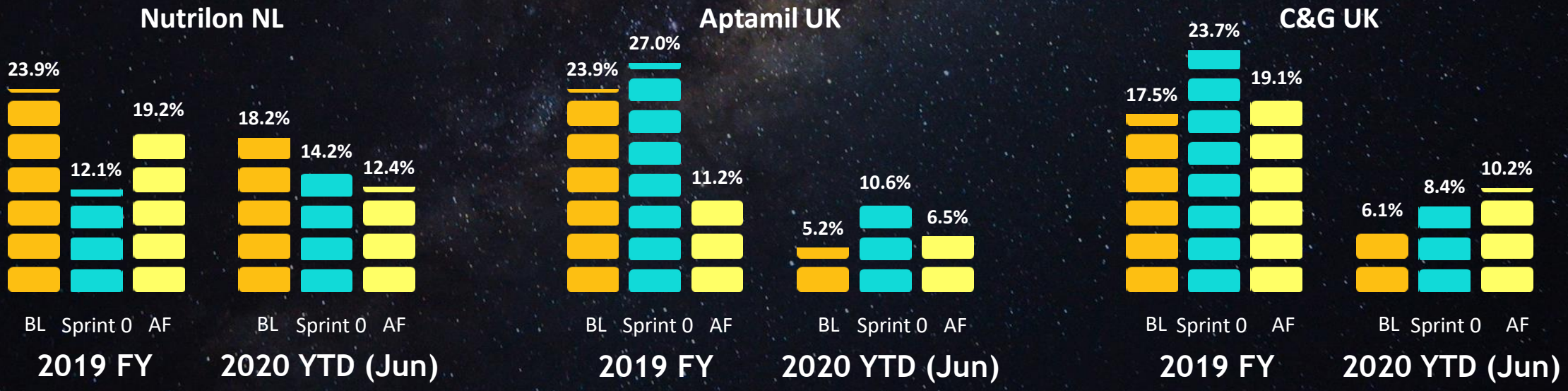




# IL Brand Performance – R6M Bias

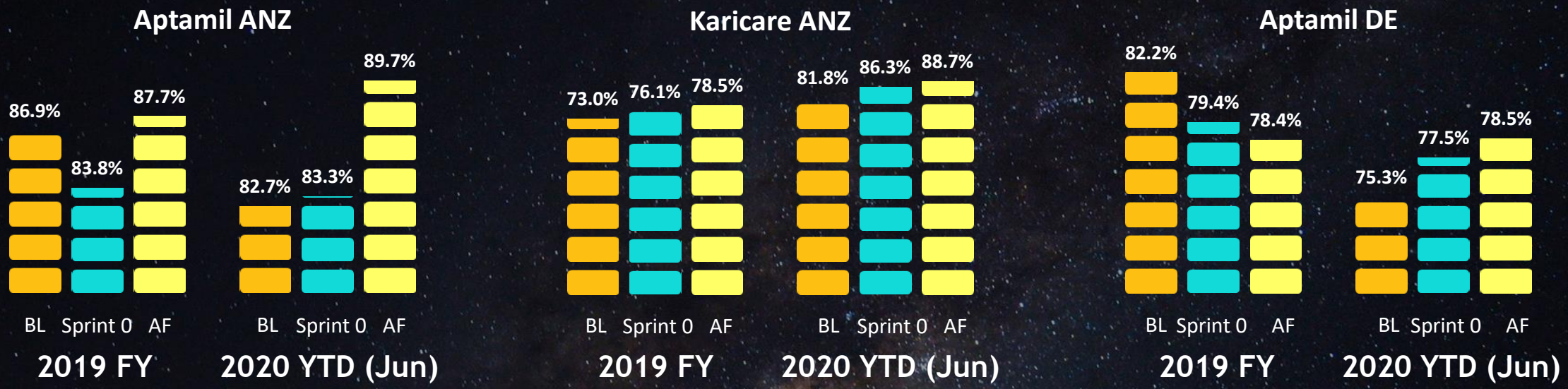
- Overall AF shows better performance than Baseline and Sprint 0, 2020 even better than 2019.

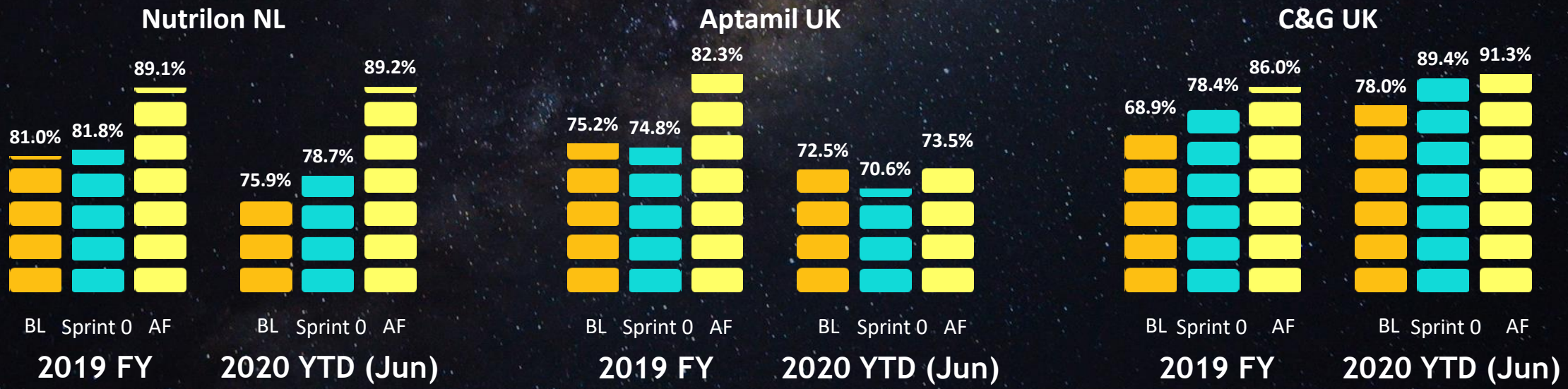


# IL Brand Performance – M-1 Forecast Accuracy

- AF IL overall performs well on M-1 FA for both 2019 and 2020.

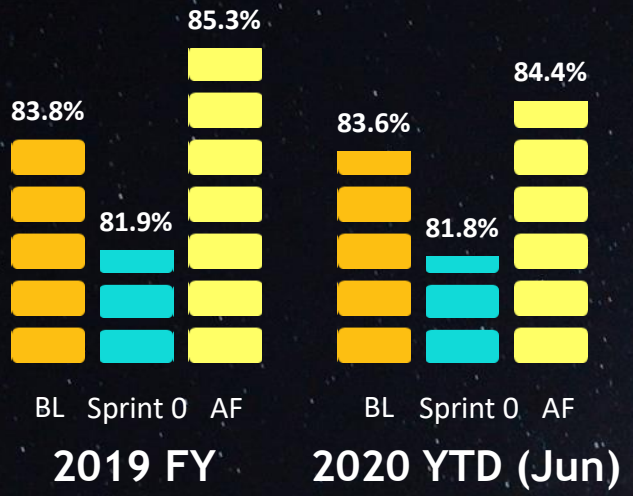


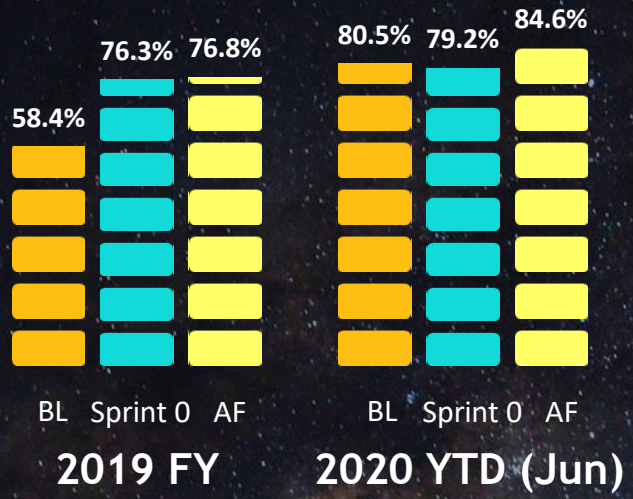
# IL Brand Performance – M-4 Forecast Accuracy

- AF IL improves a lot on M-4 FA for both 2019 and 2020, especially on ANZ and NL. DE still has room to improve.

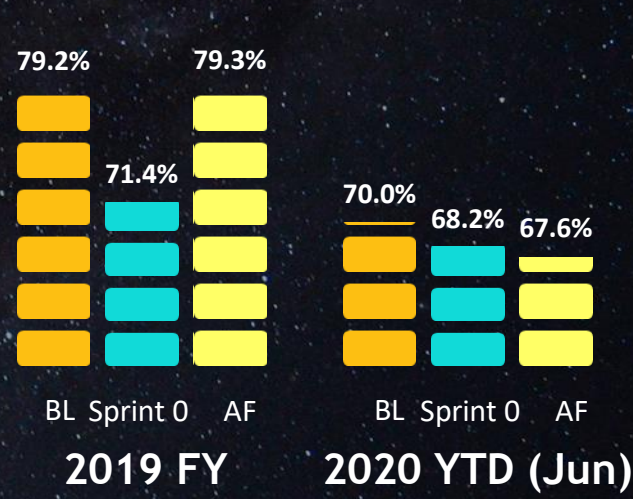
## Aptamil ANZ



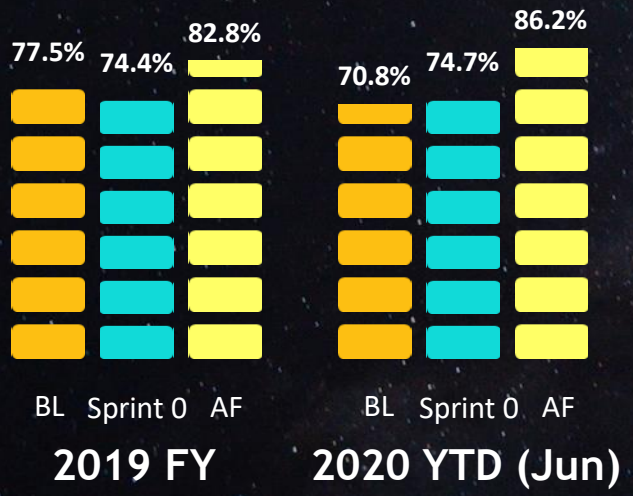

## Karicare ANZ



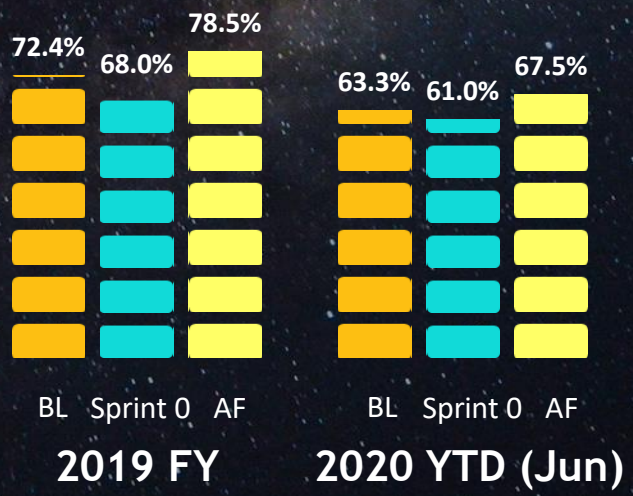

## Aptamil DE



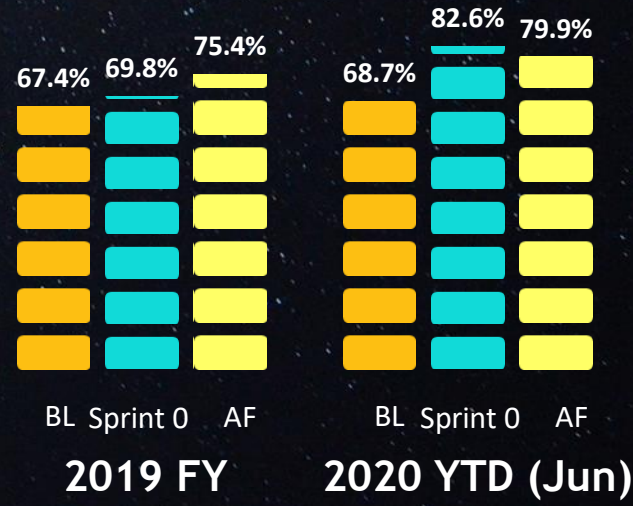

## Nutrilon NL




## Aptamil UK




## C&G UK



# 03

# Industrailization plan

01-1. Industrailization roadmap

01-2. Business impact & Development Cost

# Industrialization Roadmap

| Key Tasks | July | | August | | | | September | | | | October | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W3 | W4 | W1 | W2 | W3 | W4 | W1 | W2 | W3 | W4 | W5 | W1 | W2 |
| **POC Deliverable**<br>Code / Docs./Hand-over | | | | | | | | | | | | | |
| **Data Prep**<br>Coding / UAT | | | | | | | | | | | | | |
| **HIVE Table**<br>Data Governance | | | | | | | | | | | | | |
| **Model**<br>Coding / UAT / Output | | | | | | | | | | | | | |
| **Web-Portal**<br>Training / UAT | | | | | | | | | | | | | |
| **Project Scheduling**<br>Azkaban | | | | | | | | | | | | | |
| **Authority and Access Management** | | | | | | | | | | | | | |

# AF Development Budget (in RMB)

## POC COST

### Development cost - MVP

- 100% Data scientist (9750 * 66 * 100%)
- 20% Data tech manager (12000 * 66* 20%)

835K

### Internal cost

Danone internal FTE*

- 10% Business owner (1667 * 66 * 10%)
- 30% Use case manager (1667 * 66 * 30%)
- 50% Data scientist (1667 * 66 * 50%)
- 30% Data engineer (1667 * 66 * 30%)
- 20% Topic experts (1667 * 66 * 20%)

140K

## INDUST COST

### External cost

- Industrialization vendor (2500 * 25 * 1.06 )

66K

### Internal cost

Danone internal FTE*

- 10% Business owner: James (1667 * 60 * 10%)
- 30% Use case manager: Julie (1667 * 60 * 30%)
- 30% Data engineer: Angie (1667 * 60 * 30%)
- 20% Data tech manager: Jasper / Jack (1667 * 60* 20%)

90K

**Note: FTE cost based on estimation of 1667/working day**

# Business Impact

### Reduce write off cost

Save millions of non-quality cost

### Efficiency improvement

Take full use of man and machine' s advantage and focus man power on the brands need more attentions

### Gain insights

More objective results with category and marketing insights through machine learning' s consolidation of various features and external/internal data

### Continous improvement for FAB

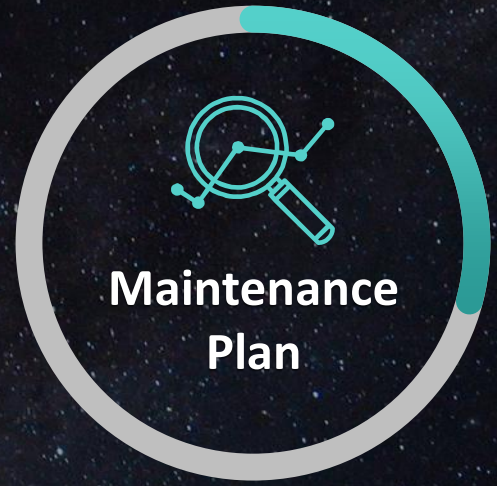
Able to simulate different scenarios while more features and insights come in

# 04

# Decision: Go/No GO?

# Decision: GO / NO GO?






## Target:

- M-1 Bias within +- 3%
- M-4 Bias within +-5%
- R6M<=5%
- Random monthly +/- bias

## Achievement:

| TTL IL | M-1 Bias | M-4 Bias | R6M Bias |
|---|---|---|---|
| 2019 | | | |
| 2020 | | | |

**Run AF in parallel with offline forecast**

## Suggestion:

- Tracking monthly performance of Brand / Sub-brand / Combined Model
- Need additional assessment judgment when AF provides pessimistic FCST result.
- AF could be leading scenario when there is a short-term positive signal.

## Maintenance Plan:

- **Data Scientist:** Review model when performance become worse.
- **Data Engineer:** Maintain data pipeline and monthly task flow.
- **ISIT**: IT support.
- **Business Team:** Provide business insights.

# 05

# Appendix

01-1. Target Achievement by Country-Brand

01-2. DI performance catchup

01-3. DC performance catchup

# Target Achievement by Country-Brand

| Brand | KPI | 2019 | 2020 |
|---|---|---|---|
| Aptamil ANZ | M-1 Bias | | |
| Aptamil ANZ | M-4 Bias | | |
| Aptamil ANZ | R6M | | |
| Karicare ANZ | M-1 Bias | | |
| Karicare ANZ | M-4 Bias | | |
| Karicare ANZ | R6M | | |
| Aptamil DE | M-1 Bias | | |
| Aptamil DE | M-4 Bias | | |
| Aptamil DE | R6M | | |
| Nutrilon NL | M-1 Bias | | |
| Nutrilon NL | M-4 Bias | | |
| Nutrilon NL | R6M | | |
| Aptamil UK | M-1 Bias | | |
| Aptamil UK | M-4 Bias | | |
| Aptamil UK | R6M | | |
| C&G UK | M-1 Bias | | |
| C&G UK | M-4 Bias | | |
| C&G UK | R6M | | |

## Suggestion for Country-Brand

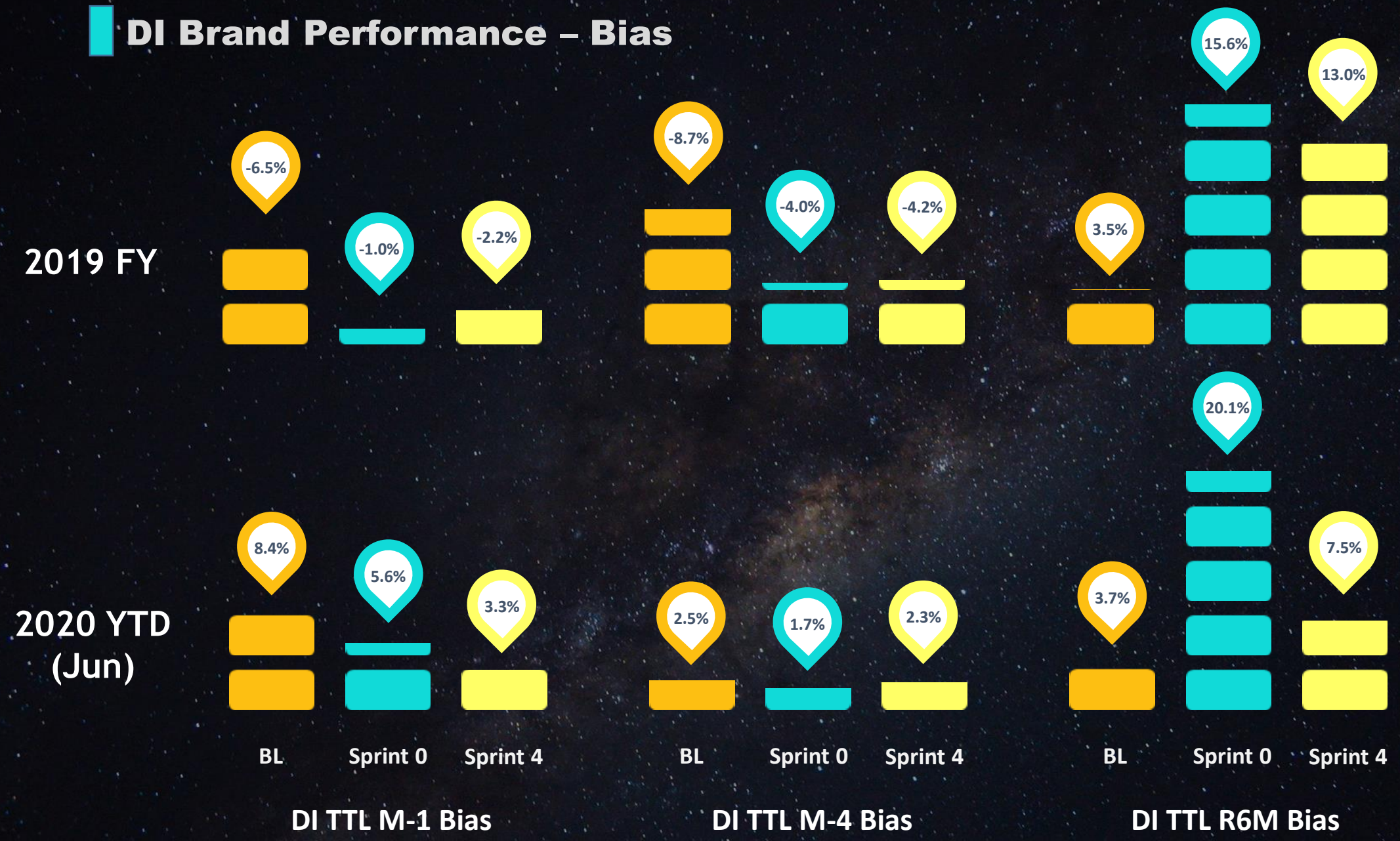
**Take FCST Suggestion:**

- ANZ Aptamil
- ANZ Karicare
- Nutrilon NL

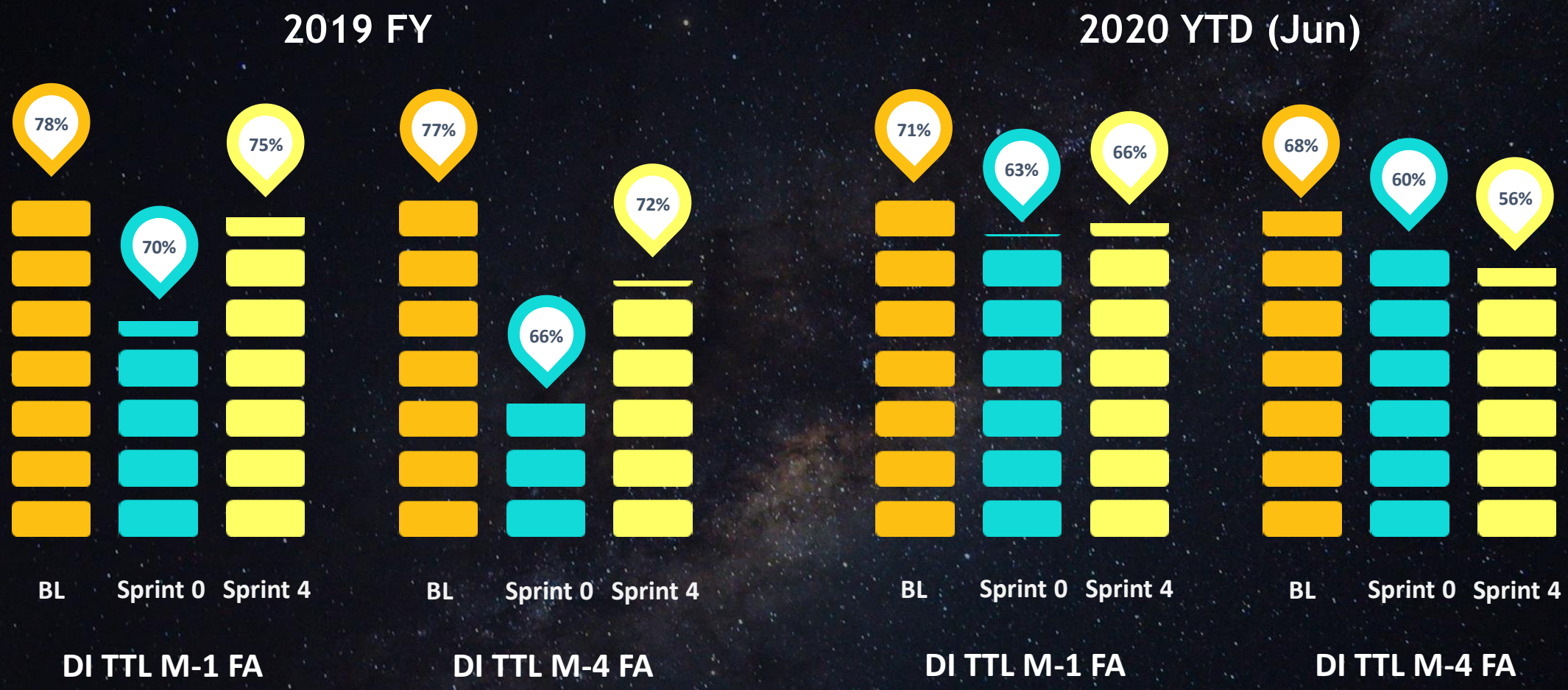
**Run Parallel with Offline FCST:**

- DE Aptamil
- UK Aptamil
- UK C&G

# DI Brand Performance – Bias

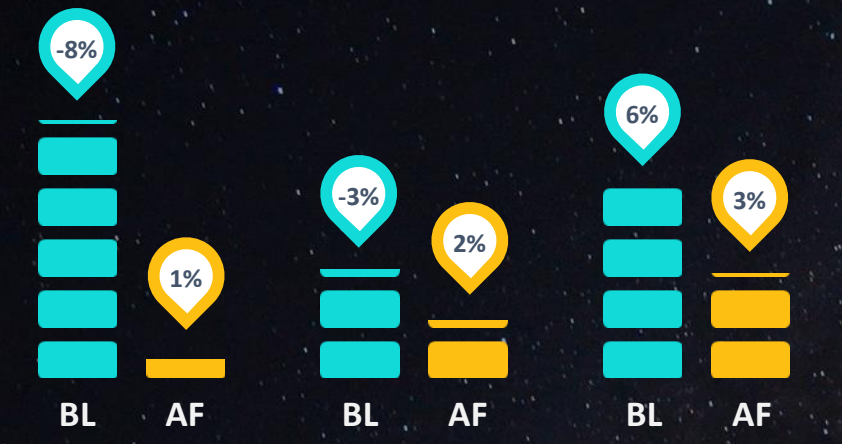


# DI Brand Performance – FA




- AF IL final model didn't reduce DI performance.
- DI overall has better performance than Sprint 0, but still have room for improvement with an independent DI model.

# DC Summary (2020 YTD)




## 01
## Localization

- Transfer ELN AF project mechanism from global to local
- Migrate the Smart-Data platform to the Local Data Lake

## 02
## Data Governance

- Leverage DC sales data on Sales BI Hive to reduce manual upload

## 03
## Industrialization

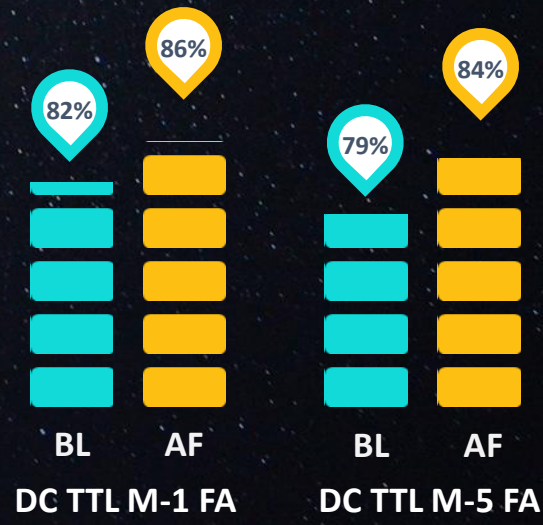
- Automatically generate DC advanced forecast with finetuned AF Model on monthly basis

## 04
## Cycle-Run

- Take about 25 minutes to finish the complete task flow (from Data Prep to FCST Generation)

## 05
## Performance Review

- AF keeps performing well
- 90% DC SKUs are following AF FCST




Thank you