

DDE Supplement / Attachment

DDIdentifier ⁽¹⁰⁾	DDName
214	Lifetime Bale Count
519	Last Bale Lifetime Count
	“Last Bale DDIs”

Version: 1.0

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1 Production and Disposition of Bales

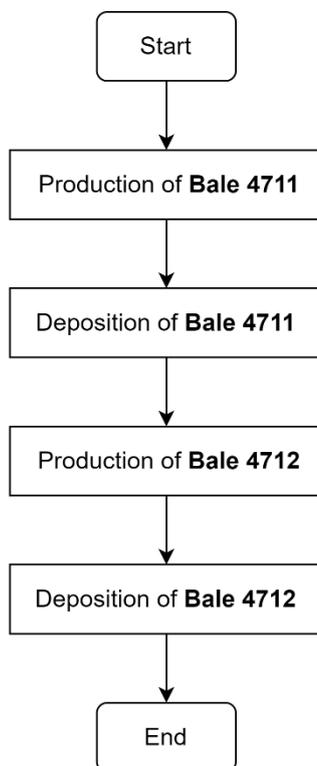
As the number of bale related DDIs increased, the correct usage of those DDIs shall be clarified. The process for a simple baler (e. g. Round Baler without Wrapper) is: pick up material, press bale and deposit bale on the field. Therefore you can easily identify where and when the produced bale was deposited. For a complex baler (e. g. Square Baler) is the process is more sophisticated. As the machine is continuously producing bales and

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depositing the bales sometime after it was produced, it is quite hard to identify where a produced bale was deposited on the field. The difference can be seen in Figure 1.

Deposition of Bale directly after
Production
(e.g. Round Baler without Wrapper)



Deposition of Bale **not** directly after
Production
(e.g. Square Baler)

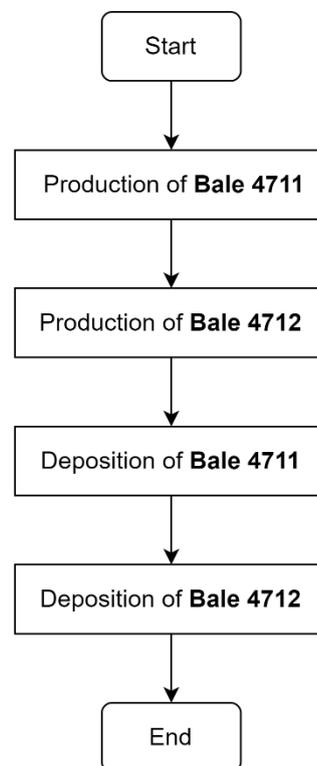


Figure 1: Comparison of Bale Depositions directly and not directly after Production

To get a connection between the produced and deposited bale DDI 519 “Last Bale Lifetime Count” was created. The definition is: “The Lifetime Bale Count of the bale that leaves the machine. The value shall be **equal** to the **Lifetime Bale Count** that was reported when this bale is knotted.” And in the comment you can find “The recommended use of this DDE is for a baler to **report this once** for every bale that **leaves the machine.**”

The definition of DDI 214 “Lifetime Bale Count” is: “The **number of bales produced** by a machine over its entire lifetime”. And in the comment you can find “The recommended use of this DDE is for a baler to **report this once** for every bale that **is produced.**”

Therefore the machine shall report the “Lifetime Bale Count” (DDI 214) when a bale was produced and shall report the “Last Bale Lifetime Count” (DDI 519) when the bale leaves the machine respectively is deposited on the field. See Figure 2.

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Deposition of Bale directly after Production
 (e.g. Round Baler without Wrapper)

Deposition of Bale **not** directly after Production
 (e.g. Square Baler)

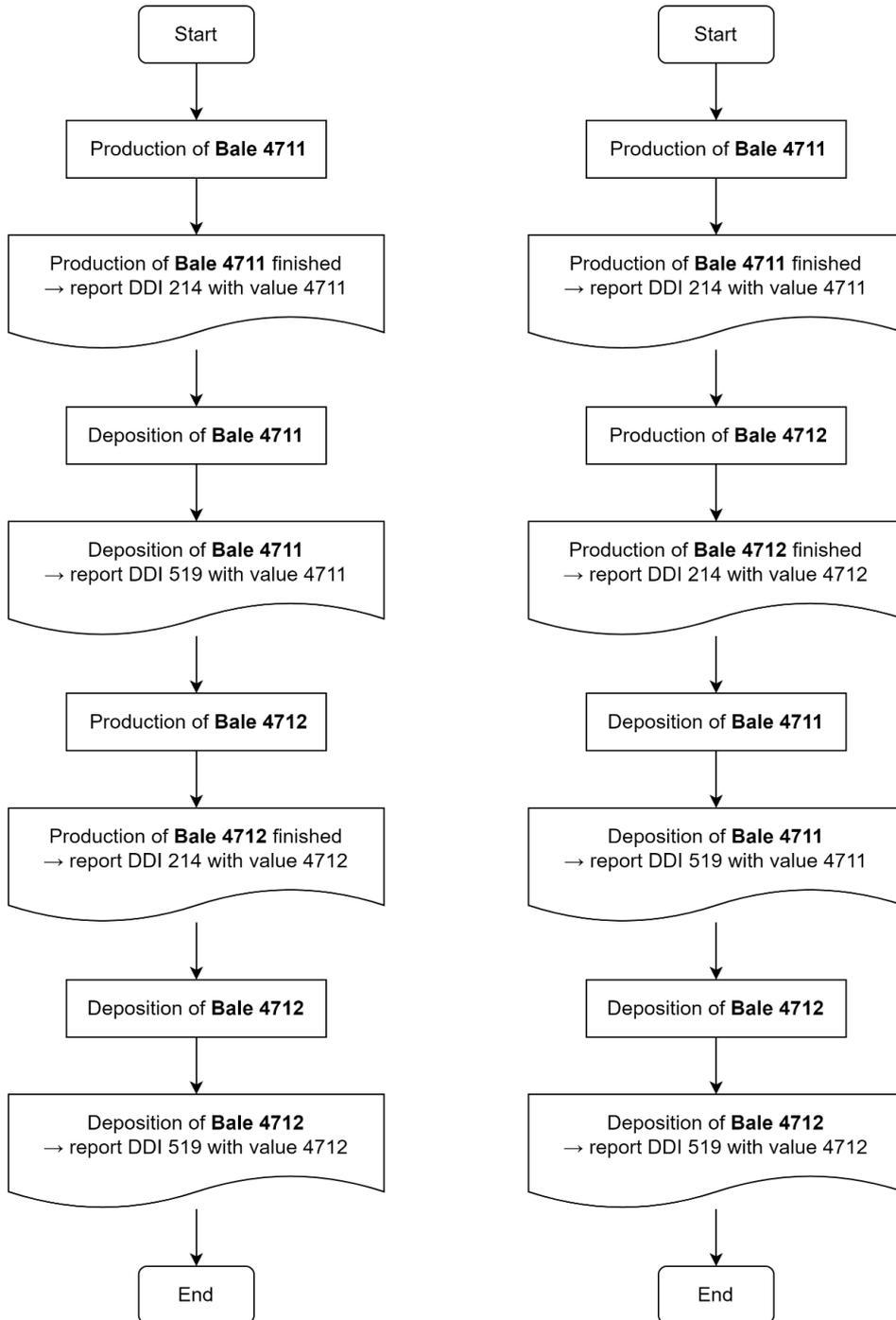


Figure 2: Comparison of Bale Depositions with DDI reporting directly and not directly after Production

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1.1 Examples

The following tables show the output of DDI values over time. The examples contain “Lifetime Bale Count” (DDI 214) and “Last Bale Lifetime Count” (DDI 519).

1.1.1 Round Baler without Wrapper

A Round Baler without Wrapper typically deposits a bale on the field directly after the bale was produced, see Table 1.

Timestamp	Lifetime Bale Count	Last Bale Lifetime Count	Comment
	DDI 214	DDI 519	
T0	4710		Starting point
T1	4711		Production of Bale 4711 finished
T2		4711	Deposition of Bale 4711
T3	4712		Production of Bale 4712 finished
T4		4712	Deposition of Bale 4712

Table 1: Example for Round Baler without Wrapper

1.1.2 Square Baler

Table 2 shows the deposition of bales not directly after the bale was produced. This is typically the case for Square Balers.

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Timestamp	Lifetime Bale Count	Last Bale Lifetime Count	Comment
	DDI 214	DDI 519	
T0	4710		Starting point
T1	4711		Production of Bale 4711 finished
T2	4712		Production of Bale 4712 finished
T3		4711	Deposition of Bale 4711
T4		4712	Deposition of Bale 4712

Table 2: Example for Square Baler

2 “Last Bale” DDIs

“Last Bale” DDIs, e.g. “Last Bale Mass” (DDI 223), are used to describe attributes of a bale that was produced by the machine. In the comments for all “Last Bale” DDIs you can find the sentence “The recommendation for data logging is that **all "Last Bale" DDEs** that are supported by a device are **reported together** at the moment that the **bale is produced and leaves the machine.**” Therefore all the bale attributes aka “Last Bale” DDIs shall be reported at the point in time when the corresponding already produced bale leaves the machine. This can be seen in Figure 3.

The machine is responsible for collecting the attributes of the bale, regardless of whether the determination takes place during the collection, the production or directly before the deposit.

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Collection of data for "Last Bale" DDIs
 (e.g. Square Baler with Size, Moisture and Mass determination)

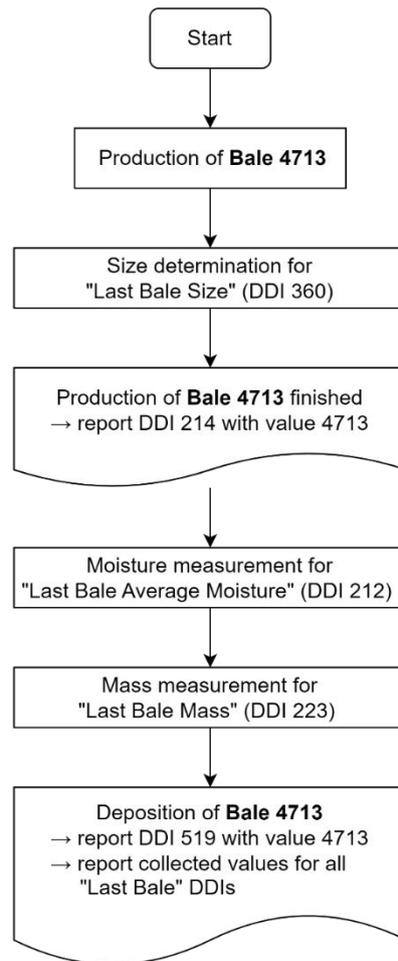


Figure 3: Collection and reporting of "Last Bale" DDIs for one Bale only

2.1 Examples

The examples of the following tables is also valid for all "Last Bale" DDIs, not only for the "Last Bale" DDIs used as an illustration. "Last Bale" DDIs used in these examples are "Last Bale Average Moisture" (DDI 212), "Last Bale Mass" (DDI 223) and "Last Bale Size" (DDI 360).

2.1.1 Sequential Bale production and deposition

Table 3 shows an example where bales are deposited on the field directly after they have been produced.

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Timestamp	Lifetime Bale Count	Last Bale Lifetime Count	Last Bale Size	Last Bale Average Moisture	Last Bale Mass	Comment
	DDI 214	DDI 519	DDI 360	DDI 212	DDI 223	
T0	4712					Starting point
T1	4713					Production of Bale 4713 finished
T2		4713	2330	83000	498000	Deposition of Bale 4713
T3	4714					Production of Bale 4714 finished
T4		4714	2330	83000	498000	Deposition of Bale 4714

Table 3: Example for sequential Bale production and deposition

2.1.2 Bale production and deposition in parallel

The example in Table 4 illustrates bales that have been deposited on the field not directly after they have been produced. After one bale was produced another bale production took place.

Timestamp	Lifetime Bale Count	Last Bale Lifetime Count	Last Bale Size	Last Bale Average Moisture	Last Bale Mass	Comment
	DDI 214	DDI 519	DDI 360	DDI 212	DDI 223	
T0	4714					Starting point
T1	4715					Production of Bale 4715 finished
T2	4716					Production of Bale 4716 finished
T3		4715	2510	77800	412000	Deposition of Bale 4715
T4	4717					Production of Bale 4717 finished
T5		4716	2440	79900	423400	Deposition of Bale 4716
T6		4717	2490	82600	425000	Deposition of Bale 4717

Table 4: Example for Bale production and deposition in parallel

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3 Recommended DDI settings

The Table 5 provides an overview about the recommended DDI settings.

DDI decimal	DDI ISO name	Type		Properties		Trigger Methods				
		DPD	DPT	Setable	Default set	Time interval	Distance Inverval	Threshold limits	On change	Total
214	Lifetime Bale Count	X							X	X
519	Last Bale Lifetime Count	X							X	
	All "Last Bale" DDIs	X							X	

Table 5: Recommended DDI settings

The "Last Bale Lifetime Count" (DDI 519) and all "Last Bale" DDIs are supposed to be changed at the same point in time, so these DDIs work together as one "Dataset".

4 Device Description Object Pool (DDOP)

Below are three examples of a Device Description Object Pool (DDOP). A final or production design may differ from this example.

4.1 DDOP for one Device Element

If only one Device Element is defined, this can lead to inaccuracies in the position of a bale deposition. The exact deposition area is not geometrically defined, see Figure 4. The illustrated DDOP only contains the DDIs and Device Elements that are relevant for the bale documentation.

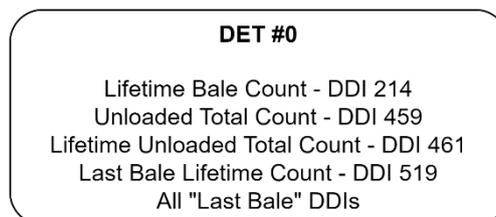


Figure 4: DDOP for one Device Element

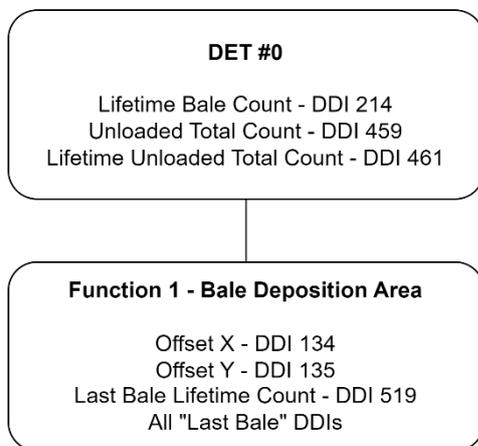
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4.2 DDOP for one Bale Deposition Area

If you define a Device Element for the Bale Deposition Area, you can define the exact geometric position of this area, see Figure 5. The illustrated DDOP only contains the DDIs and Device Elements that are relevant for the bale documentation.

Device Description Object Pool (DDOP)



Geometry

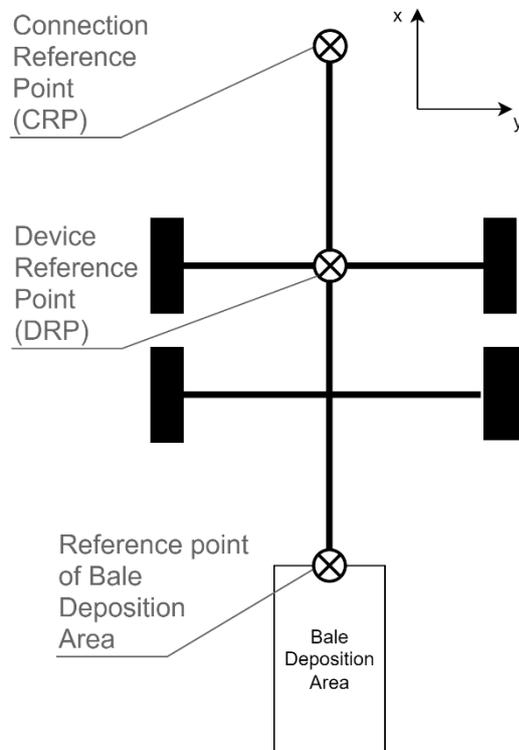


Figure 5: DDOP and Geometry for one Bale Deposition Area

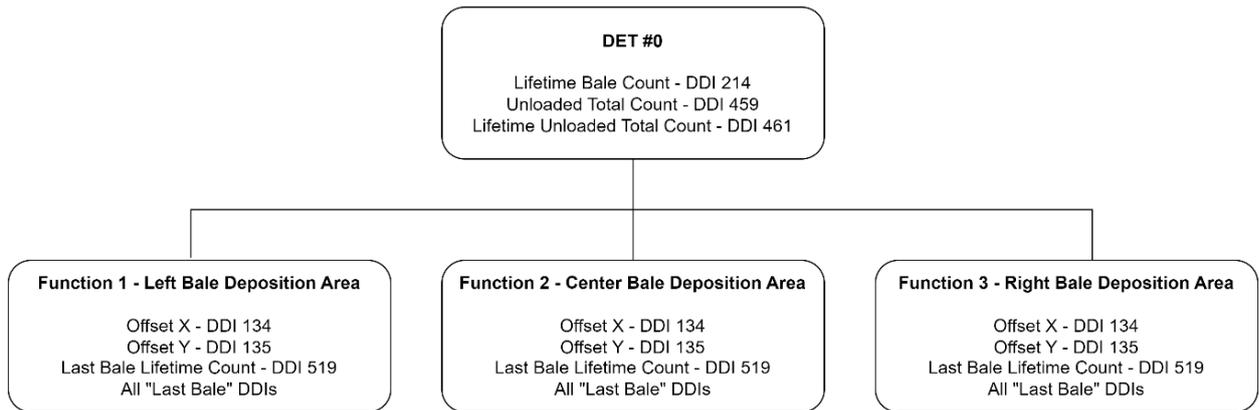
4.3 DDOP for multiple Bale Deposition Areas

If you have more than one Bale Deposition Area, you can define each Bale Deposition Area as one Device Element. Moreover, you can define the exact geometric position of this area, see Figure 6. An example of this would be a Square Baler with integrated Bale Accumulator. The illustrated DDOP only contains the DDIs and Device Elements that are relevant for the bale documentation.

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Device Description Object Pool (DDOP)



Geometry

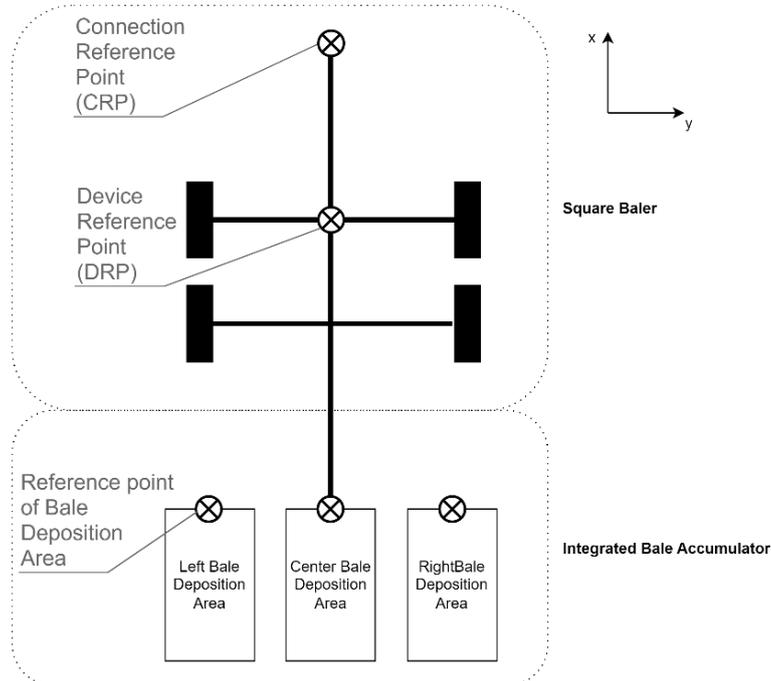


Figure 6: DDOP and Geometry for multiple Bale Deposition Areas

5 Complete Examples

Examples of how and when which DDIs are reported for different machines are given below. In addition to the DDIs already used above, the DDIs “Unloaded Total Count” (DDI 459) and

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“Lifetime Unloaded Count” (DDI 461) are used. These indicate how many bales were deposited in a Task (DDI 459) and in the lifetime of the machine (DDI 461). For each of the examples, it is assumed that a new Task has been started, so the Task Totals start with value 0. Timestamp *T0* always indicates the initial situation. The usage of the illustrated “Last Bale” DDIs is always the same and can be applied to all existing “Last Bale” DDIs.

5.1 Round Baler

Table 6 shows a complete example for a Round Baler. The bales are deposited on the field directly after they have been produced. The machine collects and reports bale attributes “Last Bale Applied Preservative” (DDI 221) and “Last Bale Size” (DDI 360).

Timestamp	Main Device Element - DET #0					
	Lifetime Bale Count	Unloaded Total Count	Lifetime Unloaded Total Count	Last Bale Lifetime Count	Last Bale Applied Preservative	Last Bale Size
	DDI 214	DDI 459	DDI 461	DDI 519	DDI 221	DDI 360
T0	4717	0	4717			
T1	4718					
T2		1	4718	4718	2100	325000
T3	4719					
T4		2	4719	4719	1950	319400
T5	4720					
T6		3	4720	4720	2204	329100
T7	4721					
T8		4	4721	4721	2060	331000
T9	4722					
T10		5	4722	4722	2195	317100
T11	4723					
T12		6	4723	4723	2068	319430

Table 6: Complete Example Round Baler

5.2 Round Baler with Wrapper

Table 7 shows a complete example for a Round Baler with Wrapper. The bales are produced and wrapped by the machine. The bales are deposited on the field after they have been wrapped. The machine collects and reports bale attributes “Last Bale Mass” (DDI 223) “Last Bale Size” (DDI 360) and “Last Bale Wrapping Film Consumption” (DDI 651).

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Timestamp	Main Device Element - DET #0						
	Lifetime Bale Count	Unloaded Total Count	Lifetime Unloaded Total Count	Last Bale Lifetime Count	Last Bale Mass	Last Bale Size	Last Bale Wrapping Film Consumption
	DDI 214	DDI 459	DDI 461	DDI 519	DDI 221	DDI 360	DDI 651
T0	4723	0	4723				
T1	4724						
T2	4725						
T3		1	4724	4724	315000	1250	8100
T4	4726						
T5		2	4725	4725	336700	1260	8150
T6	4727						
T7		3	4726	4726	298100	1245	8090
T8	4728						
T9		4	4727	4727	345500	1251	8210
T10	4729						
T11		5	4728	4728	280800	1257	8350
T12		6	4729	4729	315700	1248	8500

Table 7: Complete Example Round Baler with Wrapper

5.3 Square Baler

Table 8 shows a complete example for a Square Baler. The bales are deposited on the field not directly after they have been produced because they need to be wrapped first. Therefore another bale production finished before the first one is deposited on the field. The machine collects and reports bale attributes "Last Bale Tag Number" (DDI 222), "Last Bale Mass" (DDI 223) and "Last Bale Number of Knives" (DDI 645).

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Timestamp	Main Device Element - DET #0						
	Lifetime Bale Count	Unloaded Total Count	Lifetime Unloaded Total Count	Last Bale Lifetime Count	Last Bale Tag Number	Last Bale Mass	Last Bale Number of Knives
	DDI 214	DDI 459	DDI 461	DDI 519	DDI 221	DDI 360	DDI 651
T0	4729	0	4729				
T1	4730						
T2	4731						
T3	4732						
T4		1	4730	4730	1234567	450100	96
T5	4733						
T6		2	4731	4731	1234568	470200	96
T7	4734						
T8		3	4732	4732	1234569	465800	96
T9		4	4733	4733	123460	449200	48
T10	4735						
T11		5	4734	4734	123461	461000	48
T12		6	4735	4735	123462	449200	48

Table 8: Complete Example Square Baler

5.4 Square Baler with integrated Bale Accumulator

Table 9 shows a complete example for a Square Baler with integrated Bale Accumulator. Bales with “Lifetime Bale Count” (DDI 214) values 4736, 4737 and 4738 are deposited by the Bale Accumulator at the same point in time *T4*. Same behaviour for “Lifetime Bale Count” (DDI 214) values 4739, 4740 and 4741 at *T8*. The machine collects and reports bale attributes “Last Bale Average Moisture” (DDI 212), “Last Bale Mass” (DDI 223) and “Last Bale Size” (DDI 360).

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Timestamp	Main Device Element - DET #0			Function 1 - Left Bale Deposition Area				Function 2 - Center Bale Deposition Area				Function 3 - Right Bale Deposition Area			
	Lifetime Bale Count	Unloaded Total Count	Lifetime Unloaded Total Count	Last Bale Lifetime Count	Last Bale Size	Last Bale Average Moisture	Last Bale Mass	Last Bale Lifetime Count	Last Bale Size	Last Bale Average Moisture	Last Bale Mass	Last Bale Lifetime Count	Last Bale Size	Last Bale Average Moisture	Last Bale Mass
	DDI 214	DDI 459	DDI 461	DDI 519	DDI 360	DDI 212	DDI 223	DDI 519	DDI 360	DDI 212	DDI 223	DDI 519	DDI 360	DDI 212	DDI 223
T0	4735	0	4735												
T1	4736														
T2	4737														
T3	4738														
T4*		3	4738	4736	2510	7780 0	4120 00	4738	2440	7990 0	4234 00	4737	2490	8260 0	4250 00
T5	4739														
T6	4740														
T7	4741														
T8*		6	4741	4739	2230	8790 0	4550 00	4741	2251	8660 0	4610 00	4740	2300	8710 0	4680 00

Table 9: Complete example for Square Baler with integrated Bale Accumulator

* 3 bales are deposited at the same point in time

6 Further recommended DDIs

Next to “Lifetime Bale Count” (DDI 214), “Last Bale Lifetime Count” (DDI 519) and the “Last Bale” DDIs it is recommended to report the following Task and Lifetime Total DDIs

- “Yield Total Count” (DDI 91) as number of Bales produced within a Task
- “Precut Total Count” (DDI 283) as number of pre-cutted Bales within a Task
- “Uncut Total Count” (DDI 284) as number of un-cutted Bales within a Task
- “Lifetime Precut Total Count” (DDI 285) as number of pre-cutted Bales within the lifetime of a machine
- “Lifetime Uncut Total Count” (DDI 286) as number of un-cutted Bales within the lifetime of a machine
- “Unloaded Total Count” (DDI 459) as number of Bales deposited on the field within a Task

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- “Lifetime Unloaded Total Count” (DDI 461) as number of Bales deposited on the field within the lifetime of a machine

Furthermore it is recommended to report the following process related DDIs

- “Crop Moisture” (DDI 99)
- “Actual Bale Width” (DDI 102)
- “Actual Bale Height” (DDI 107)
- “Actual Bale Size” (DDI 112)
- “Actual Bale Hydraulic Pressure” (DDI 216)
- “Actual Bale Compression Plunger Load” (DDI 219)
- “Actual Bale Compression Plunger Load (N)” (DDI 548)